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Cancer Morbidity In Urban and Rural Iowa

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Foreword

As part of a study designed to evaluate visual education methods for control of breast cancer, conducted by the Iowa State Medical Society and the Iowa State Department of Health, data on cancer incidence in Iowa were required. A morbidity survey to collect these data was supported in part by Cancer Control Grant CS-9149 from the National Cancer Institute. The survey was conducted under the auspices of the State medical society and the department of health and was under the administrative direction of Dr. Edmund G. Zimmerer, who was at that time director, division of cancer control, Iowa State Department of Health.

The National Cancer Institute provided technical assistance. Dr. Harold F. Dorn furnished technical guidance and Samuel C. Marcus was assigned to Iowa for the duration of the field work, assisting Dr. Zimmerer in the supervision of the survey team. The procedures for collecting the data were patterned after those used by the National Cancer Institute in other morbidity surveys. The biometry section of the institute also undertook the responsibility for processing and tabulating the data.

Dr. Walter L. Bierring, Iowa Commissioner of Health at the time of the study, contributed to the initial planning and gave the project his enthusiastic support. Among the agencies which endorsed and cooperated in the study were the State Hospital Council and the State Osteopathic Society.

September 1955

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Special mention should be made of the assistance of Loren E. Chancellor, director, division of vital statistics, Iowa State Department of Health, and Edward E. Wieben, statistician, tumor registry, University Hospitals, University of Iowa.

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Introduction

The Iowa study of cancer morbidity provided the first opportunity to collect morbidity data for both urban and rural populations using morbidity survey techniques developed by the National Cancer Institute. Previously, cancer morbidity surveys had been conducted in metropolitan centers. This survey was conducted under the auspices of the Iowa State Medical Society and the Iowa State Department of Health.

The survey was undertaken to answer such questions as: How many people have cancer? What sites are most frequently involved? What are the age and sex distributions associated with cancer of specific sites? What differences appear in urban and rural populations? Answers to these questions depend on the careful investigation of cancer occurrence in representative population groups.

Data available from mortality records do not provide complete answers to questions of this type. Death is more likely to result from cancer of certain sites than from cancer of other sites, and conclusions concerning the number of persons with the disease, as well as the tissues and organs affected, differ from the conclusions drawn from morbidity records. Morbidity data collected from an individual hospital or clinic also have a limited usefulness because they usually cannot be related to a defined population group at risk.

Because data from both these sources are inadequate for working out the epidemiology for cancer of various sites, an effort was made to obtain reports on all cancer patients treated or observed by hospitals, clinics, and physicians in the entire State during 1950. Graduate university students were employed to assist in abstracting hospital and clinic records. A questionnaire was mailed to every physician in the State, and personal visits were made to physicians who did not respond. The field staff assisted in compiling data from office records when requested to do so by physicians. In this manner, reports were obtained from over 99 percent of the hospitals and clinics in the State and from about 88 percent of the physicians. Contact was also made with nursing homes to obtain supplementary data as needed. The schedule [1] made provision for recording name; address; sex; race; age of the patient; whether alive or dead at time of survey; dates first seen, last treated, and last seen for cancer; method of diagnosis; stage of cancer when first diagnosed; site or sites affected; histological type; and periods of hospitalization. Information on name and address was used only to identify cases and to eliminate duplicate reports and reports of nonresidents, an essential requirement for the computation of resident illness rates.

Data on cancer deaths for Iowa residents were obtained from the division of vital statistics of the Iowa State Department of Health. Information was obtained from all 1950 death certificates on which cancer was mentioned. In addition, the names of patients reported to be dead as of January 1, 1951, but for whom no death certificate had been located, were checked against death certificate indexes for the period January 1950–June 1951. This procedure made it possible to compute survival rates for newly diagnosed cases enumerated in the survey.

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[1] See appendix, page 55.

Scope, Coverage, and Accuracy of Data

Numbers and Types of Cases

The survey procedures identified a total of 14,834 Iowa residents under medical supervision for cancer during 1950. Of this number, 38.7 percent had been under medical care prior to 1950 and had been under treatment or observation or had died during the study year. The 61.3 percent counted as diagnosed during 1950 comprised two groups: the 55.3 percent so reported by physicians and hospitals and the 6.0 percent located only by examination of the death certificates filed in 1950 (table 1).

Among the males, 36.2 percent of the cases had been diagnosed during a prior year. This was lower than the corresponding figure for females, 41.0 percent. The variation by population-size group was not pronounced, 38.0 percent of the urban residents having been diagnosed in a prior year, compared to 39.6 percent of persons from rural areas. Within the urban group, there was a consistent gradient, the lowest proportion being encountered in the cities of over 50,000 population. Differences of this nature can readily arise from variation with respect to primary site, stage at diagnosis, and survival, topics discussed later in the text.

The major emphasis in analysis and discussion has been directed to cases first diagnosed in 1950. Physicians and hospital record librarians are less prone to overlook records of newly diagnosed cases than to overlook records of cases diagnosed in an earlier year and currently under treatment. For this reason, cases first diagnosed in a year provide a better approximation of incidence than do total reported cases, of prevalence.

The population of Iowa is predominantly white; only 41 nonwhite residents were reported under care for cancer in 1950. Therefore, no attempt has been made to present material by race in this report. The Iowa data may be compared with the data reported for whites elsewhere.

Table 1. Cancer cases diagnosed during and prior to the study year,[1] by sex and residence status

Sex and residence status	Total	Diagnosed during 1950				Diagnosed prior to 1950					
		Reported by physicians and hospitals		Recorded from death certificates		Recorded from death certificates [2]		Treated during 1950		Seen in 1950 for checkup only	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Residents	14,834	8,198	55.3	890	6.0	165	1.1	4,086	27.5	1,495	10.1
Male	6,970	3,993	57.3	456	6.5	57	.8	1,937	27.8	527	7.6
Female	7,864	4,205	53.5	434	5.5	108	1.4	2,149	27.3	968	12.3
Urban	8,177	4,626	56.6	438	5.4	91	1.1	2,191	26.7	831	10.2
50,000 population and over	2,976	1,805	60.7	152	5.1	36	1.2	726	24.4	257	8.6
10,000–49,999 population	2,552	1,416	55.5	130	5.1	22	.9	723	28.3	261	10.2
2,500–9,999 population	2,649	1,405	53.1	156	5.9	33	1.2	742	28.0	313	11.8
Rural	6,657	3,572	53.6	452	6.8	74	1.1	1,895	28.5	664	10.0
Nonresidents	844	489	------	39	------	8	------	227	------	81	------

[1] 1950.

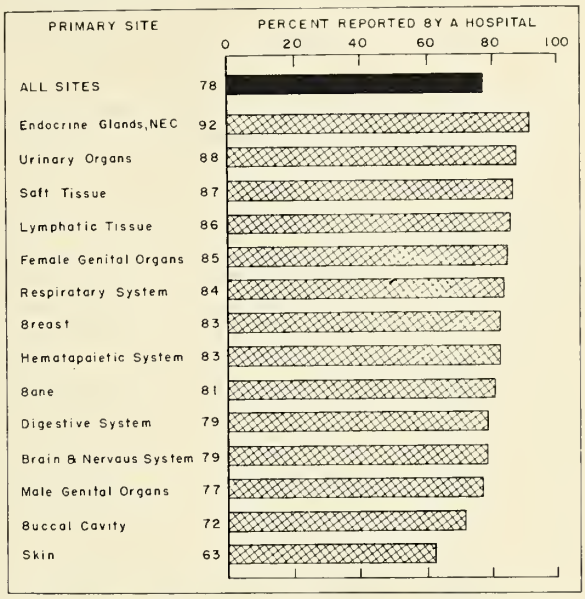
[2] When the date of operation shown on the death certificate was earlier than 1950, the case was considered as diagnosed prior to 1950; in previous surveys, date of operation was not noted and all cases recorded from death certificates were considered newly diagnosed as of the study year.

Since the study area embraced an entire State, the proportion of nonresidents in the survey (less than 6 percent) was much smaller than that usually encountered in surveys restricted to urban medical centers, where nonresidents may comprise one-sixth to one-third of the total cases.

Completeness of Reporting

A canvass of diagnostic sources alone may understate the number of cases of cancer, either by failure of physicians and hospitals to report them or because patients did not seek medical care. A check of death certificates, noting cancer as a cause of death, is one device for compensating for incomplete reporting. In Iowa, this procedure located certificates for 890 residents dying in 1950 for whom no morbidity report or information on diagnosis in an earlier year was obtained. These deaths represented, for the most part, instances in which the certifying physician had attended the patient only at death and had only limited knowledge of his case.

Figure 1. Percentage of newly diagnosed resident cancer cases reported by a hospital, 1950, by primary site.



[1] Excludes cases recorded from death certificates.

Table 2. Total resident cancer cases diagnosed during the study year [1] and cases recorded from death certificates, by sex, area of residence, and primary cancer site

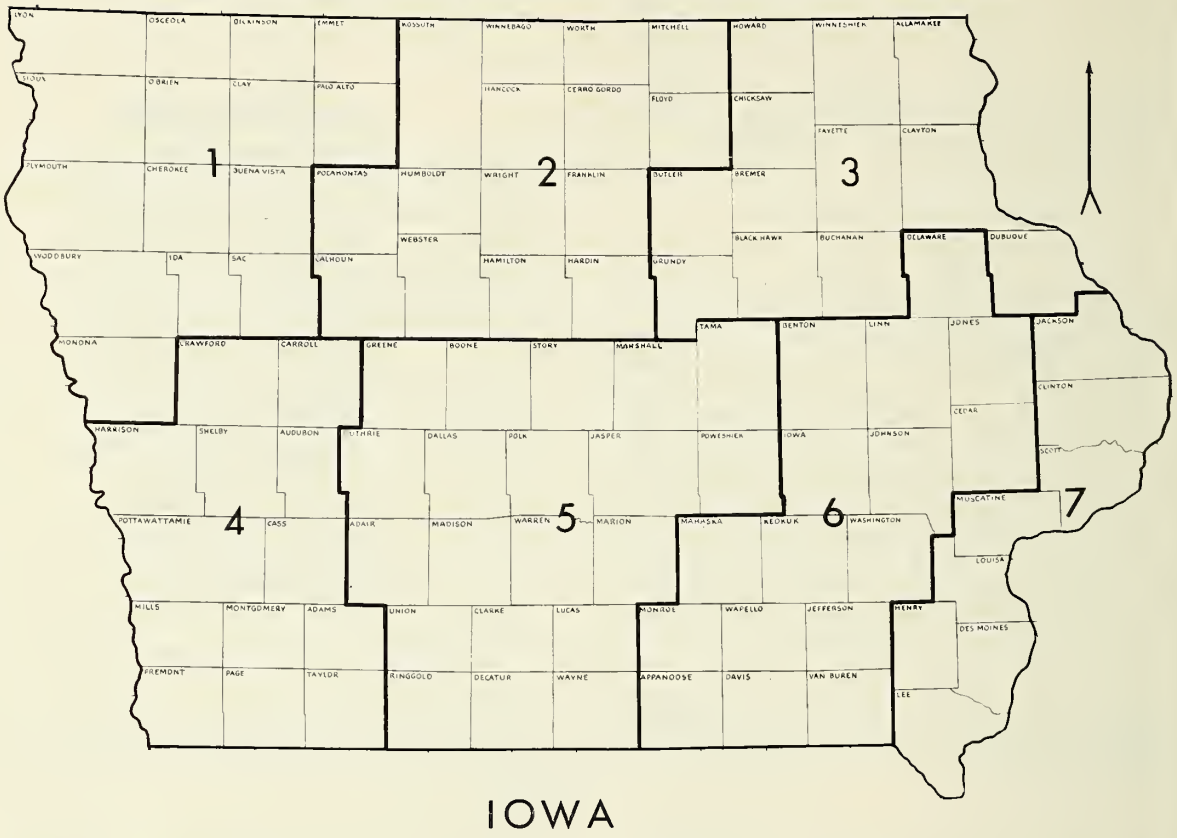
Sex, area of residence, and primary cancer site	Total cases diagnosed	Recorded from death certificates	
		Number	Percent
Total cases	9,088	890	9.8
Sex:			
Male	4,449	456	10.2
Female	4,639	434	9.4
Area of residence:			
Urban [2]	5,064	438	8.6
Rural	4,024	452	11.2
Primary cancer site:			
Buccal cavity and pharynx	490	20	4.1
Digestive system	2,284	414	18.1
Respiratory system	437	53	12.1
Breast	1,047	71	6.8
Female genital organs	1,058	52	4.9
Male genital organs	647	105	16.2
Urinary organs	439	27	6.2
Skin	1,463	9	.6
Brain and nervous system	124	23	18.5
Lymphatic tissue	214	17	7.9
Hematopoietic system	315	41	13.0
Other and ill-defined sites	570	58	10.2

[1] 1950.
[2] Includes all incorporated places of 2,500 population and over.

The rationale for adding the unreported cancer deaths to the total for newly diagnosed cases is that, for the purpose of counting cases to determine incidence, the inability to shift the tabulation base from date of diagnosis to date of onset is assumed to be not important. In the absence of the introduction of unusual case-finding procedures to upset the equilibrium, newly diagnosed cases of varying duration should compensate for newly developed cases destined not to come to diagnosis until a succeeding year.

Of the resident cases diagnosed in 1950, 9.8 percent were recorded from death certificates. The sex and urban-rural differences in this respect were minor. Whether a case remained unreported until death depended to a great extent on the relative accessibility of the site. For example, this proportion was 18.5 percent for the brain and nervous system, 18.1 percent for the digestive system, and 12.1 percent for the respiratory system, compared to 4.1 percent for buccal cavity and pharynx, and 0.6 percent for skin (table 2).

Figure 2. Regional grouping of counties of Iowa for within-State comparisons.



Source of Reports

In coding source of morbidity reports, data supplied by hospitals were selected in preference to data supplied by physicians, so that cases "reported by hospitals" include all patients receiving some hospital service. Hospitals generally provide more comprehensive facilities for diagnosis than are available in physicians' offices. Thus, the proportion of patients seen by hospitals may be accepted as a rough index of the quality of medical supervision provided in a given area. On the basis of this criterion, the 78 percent of newly diagnosed cancer cases reported by hospitals reflects the high standards of medical care in Iowa (fig. 1). The percentage compared favorably with the percentages found in morbidity surveys conducted in 10 urban areas—Atlanta, Ga.; San Francisco and Alameda Counties, Calif.; New Orleans, La.; Denver, Colo.; Pittsburgh, Pa.; Chicago, Ill.; Dallas, Tex.; Birmingham, Ala.; Detroit, Mich.; and Philadelphia, Pa.—in 1947 and 1948 (*1–10*). The percentage of newly diagnosed cases of cancer reported by hospitals in Iowa was on a par with the experience in the 4 northern cities (Philadelphia, 79 percent; Pittsburgh, 78; Chicago, 77; Detroit, 75) and superior to that reported for western and southern cities, with the exception of New Orleans. The proportion of patients residing in rural areas of Iowa who were seen in hospitals, 73 percent, although somewhat lower than the corresponding figure for patients residing in urban areas, 81 percent, approached the level attained in the northern cities. In 2 regions in Iowa, Nos. 2 and 6, the proportion of patients seen in hospitals dropped below 70 percent; the figure exceeded 79 percent in each of the other regions.[2] (See fig. 2 for outline of regions.) The survey data supported the general impres-

[2] The following source materials were consulted in arranging this regional grouping of counties: Medical service areas delineated by the bureau of medical economic research of the American Medical Association; hospital service areas outlined by the Hospital Facilities Division of the Public Health Service; and nursing districts as established by the nursing division, Iowa State Department of Health.

Table 3. Percentage of newly diagnosed cancer cases with microscopic confirmation, for urban and rural areas, by primary site and source of report

Primary site,[2] urban and rural areas	Total reported cases[1]		Reported by hospitals		Reported by physicians only	
	Total	Percent confirmed	Total	Percent confirmed	Total	Percent confirmed
All sites	[3] 8, 687	75. 5	[3] 6, 771	82. 1	[3] 1, 916	52. 5
Urban[4]	4, 626	77. 1	3, 746	82. 4	880	54. 7
Rural	3, 572	73. 4	2, 618	82. 0	954	49. 8
Buccal cavity and pharynx	482	77. 4	347	86. 2	135	54. 8
Residence:						
Urban	258	79. 1	198	85. 4	60	58. 3
Rural	212	76. 9	142	88. 7	70	52. 9
Primary site:						
Lip	254	68. 9	160	80. 0	94	50. 0
Tongue	33	81. 8	25	88. 0	8	62. 5
Mouth, other	151	89. 4	127	93. 7	24	66. 7
Pharynx	44	81. 8	35	85. 7	9	66. 7
Digestive system	1, 965	68. 8	1, 560	74. 2	405	47. 9
Residence:						
Urban	982	71. 0	821	74. 2	161	54. 7
Rural	888	66. 8	661	74. 6	227	44. 1
Primary site:						
Esophagus	49	83. 7	45	82. 2	4	100. 0
Stomach	491	53. 8	366	60. 4	125	34. 4
Intestines	683	74. 2	528	78. 6	155	59. 4
Rectum	363	87. 3	316	88. 6	47	78. 7
Liver	81	33. 3	50	46. 0	31	12. 9
Gall bladder and biliary passages	81	84. 0	70	88. 6	11	54. 5
Pancreas	167	54. 5	142	59. 9	25	24. 0
Other digestive	50	74. 0	43	81. 4	7	28. 6
Respiratory system	408	61. 0	343	65. 3	65	38. 5
Residence:						
Urban	256	60. 9	221	64. 7	35	37. 1
Rural	128	61. 7	103	68. 9	25	32. 0
Primary site:						
Larynx	34	91. 2	32	93. 8	2	50. 0
Lung and bronchus	355	57. 5	297	62. 0	58	34. 5
Other respiratory	19	73. 7	14	71. 4	5	80. 0
Breast	1, 038	88. 1	864	90. 7	174	74. 7
Residence:						
Urban	548	88. 9	484	90. 7	64	75. 0
Rural	428	87. 4	328	91. 2	100	75. 0
Female genital organs	1, 082	89. 6	918	91. 4	164	79. 9
Residence:						
Urban	608	89. 8	524	90. 8	84	83. 3
Rural	398	89. 4	327	92. 4	71	76. 1
Primary site:						
Cervix uteri	487	90. 8	402	92. 5	85	82. 4
Corpus uteri	167	95. 2	149	96. 0	18	88. 9
Uterus, other and unspecified	160	79. 4	138	81. 9	22	63. 6
Ovary	199	89. 4	168	91. 1	31	80. 6
Other female genital organs	69	92. 8	61	95. 1	8	75. 0
Male genital organs	590	69. 0	455	75. 2	135	48. 1
Residence:						
Urban	266	72. 9	217	77. 0	49	55. 1
Rural	276	62. 7	199	70. 4	77	42. 9
Primary site:						
Prostate	520	66. 2	396	73. 0	124	44. 4
Other male genital organs	70	90. 0	59	89. 8	11	90. 9

See footnotes at end of table.

Table 3. Percentage of newly diagnosed cancer cases with microscopic confirmation, for urban and rural areas, by primary site and source of report—Continued

Primary site,[2] urban and rural areas	Total reported cases [1]		Reported by hospitals		Reported by physicians only	
	Total	Percent confirmed	Total	Percent confirmed	Total	Percent confirmed
Urinary organs	449	87. 3	401	87. 3	48	87. 5
Residence:						
Urban	245	86. 5	227	86. 8	18	83. 3
Rural	167	89. 2	137	89. 1	30	90. 0
Primary site:						
Kidney	106	78. 3	91	79. 1	15	73. 3
Bladder	335	90. 1	305	89. 8	30	93. 3
Other urinary	8	87. 5	5	80. 0	3	100. 0
Skin	1, 515	70. 4	961	87. 4	554	41. 0
Residence:						
Urban	840	73. 3	540	90. 4	300	42. 7
Rural	614	66. 0	369	84. 6	245	38. 0
Eye	21	81. 0	13	100. 0	8	50. 0
Brain and nervous system	110	80. 0	84	83. 3	26	69. 2
Residence:						
Urban	62	82. 3	49	85. 7	13	69. 2
Rural	39	76. 9	31	80. 6	8	62. 5
Endocrine glands [5]	64	89. 1	59	89. 8	5	80. 0
Bone	48	68. 8	39	79. 5	9	22. 2
Soft tissue	56	92. 9	49	95. 9	7	71. 4
Lymphatic tissue	211	85. 3	180	87. 8	31	71. 0
Residence:						
Urban	116	86. 2	103	85. 4	13	92. 3
Rural	81	82. 7	67	91. 0	14	42. 9
Hematopoietic system	294	76. 9	247	76. 1	47	80. 9
Residence:						
Urban	148	78. 4	128	78. 9	20	75. 0
Rural	126	77. 8	99	75. 8	27	85. 2
Ill-defined sites	354	52. 3	251	63. 7	103	24. 3
Residence:						
Urban	201	51. 7	150	61. 3	51	23. 5
Rural	133	54. 1	86	70. 9	47	23. 4

[1] Cases recorded from death certificates excluded.
[2] The primary site classification in this and succeeding tables follows the scheme outlined by a WHO subcommittee on the registration of cases of cancer. World Health Organization: Technical Report Series, No. 53, July 1952.
[3] Includes data on 489 nonresident cases not classified as urban or rural residents.
[4] Includes all incorporated places of 2,500 and over.
[5] Not elsewhere classified.

sion of persons familiar with medical practice in Iowa that all elements of the population have relatively easy access to hospital facilities.

Differences by primary site in the proportion of cases reported by hospitals ranged from 63 percent for skin to over 80 percent for many of the more inaccessible sites (fig. 1). If returns had not been secured from private physicians, the degree of understatement for incidence and prevalence would have been most marked for such accessible sites as skin and buccal cavity.

Accuracy of Reports

These data represent an enumeration of all cancer diagnoses made by physicians for per-

sons in the population surveyed. Each respondent was requested to indicate whether or not the diagnosis was confirmed by a microscopic examination of tissue. Since more than three-fourths of all newly diagnosed cases uncovered by the survey were so confirmed, the inferences to be drawn should not change greatly whether they are based on cases diagnosed by any means or restricted to those with proved pathology. To have limited the inquiry to microscopically confirmed cases would have led to understatement of cancer incidence and prevalence. Furthermore, because microscopic examination is more frequent for accessible sites, the use of histologically proved cases only might yield distributions of cases less representative of the population at risk with respect to primary site, stage at diagnosis, and so on. The inclusion of all diagnosed cases permitted the comparison of findings from use of the two diagnostic criteria, which are reported in some detail in appendix tables 2–5 and are discussed in succeeding sections, with respect to site, age, sex, and place of residence.

In Iowa, 76 percent of the newly diagnosed cancer cases were microscopically confirmed. This was essentially the same as the overall figure for the surveys in 10 urban areas, 73 percent (northern cities, 73 percent; southern cities, 68; western cities, 77). In Iowa, a somewhat larger proportion of hospitalized cases were microscopically confirmed than in the 10 urban areas; there was no significant difference in the number of microscopically confirmed cases reported by private physicians. The important feature to note is that, presumably, the quality of the Iowa data was equal to that of data collected in surveys of highly urbanized areas elsewhere. Within Iowa, the urban-rural differential on microscopically confirmed cases was minor (urban, 77 percent; rural, 73). This suggests approximately equal reliability of diagnoses in the two population groups. For hospitalized cases, the urban and rural percentages were identical, 82 (table 3). This uniformity in rate of diagnostic confirmation was also in evidence among the seven regions. In view of the fact that only 18 pathologists in the State were engaged in active practice during 1950, some of these findings might not have been anticipated.

Whether the diagnosis of cancer was confirmed by a microscopic examination depended in part on the accessibility of the tissue affected, especially for living patients. For example, the proportion of confirmed diagnoses for accessible sites, such as cervix (91 percent), larynx (91 percent), and breast (88 percent) is clearly higher than that for inaccessible sites such as stomach (54 percent), pancreas (55 percent), and lung (58 percent).

The close correspondence of urban-rural data was also observed for the major site groups. The largest differences were observed for male genital organs and skin, with the rural figures lower in both instances (table 3). The agreement for individual sites between the Iowa and the 10-city data was also very good.

Incidence, Prevalence, and Mortality Rates

Methodology

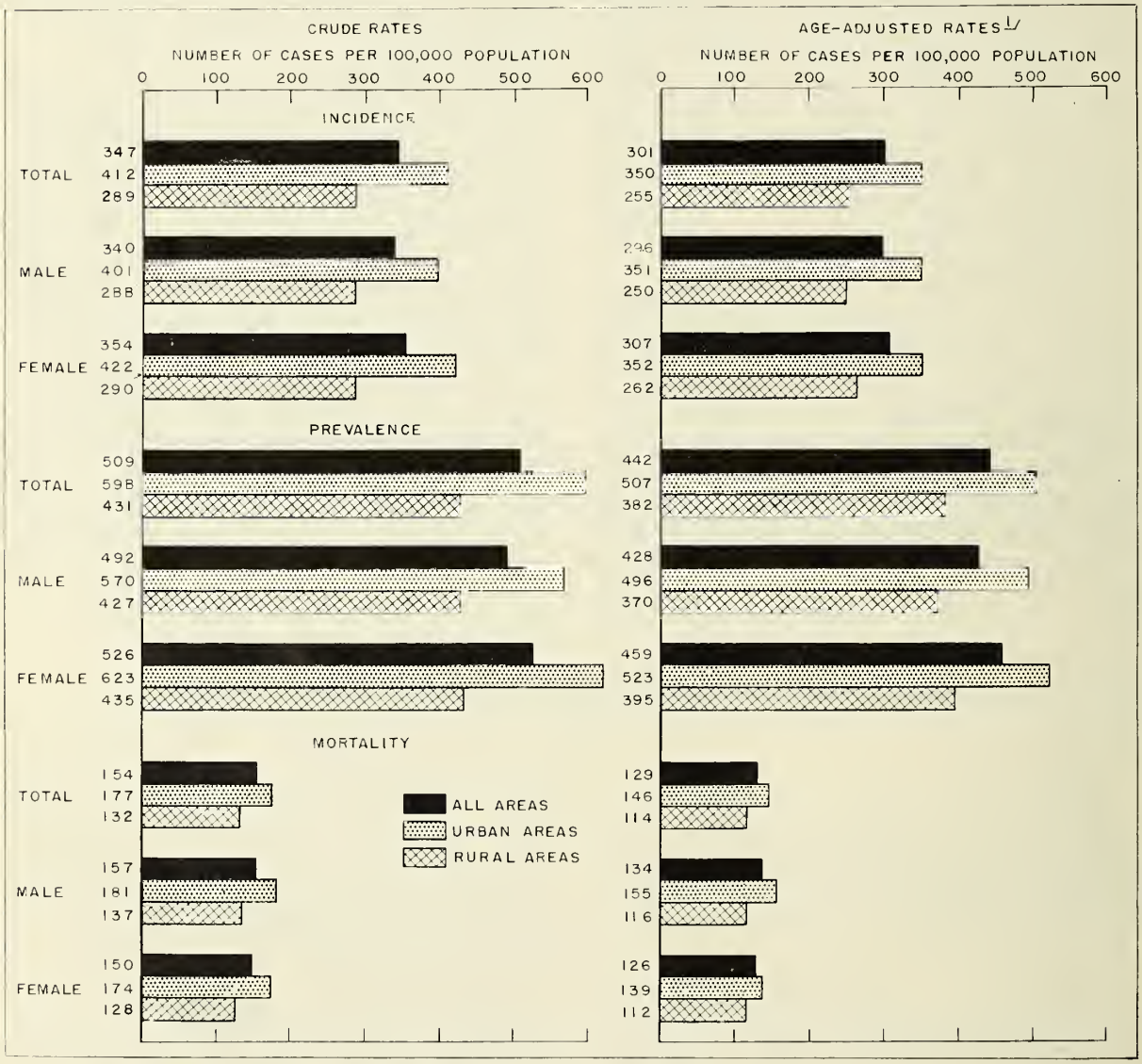
There are two typical approaches to the procurement of morbidity information. One is by means of a household survey, in which persons interviewed are asked to relate the facts concerning illness for all members of the household; the other calls for a canvass of diagnostic sources. Many considerations make it desirable that data on cancer cases be collected from diagnostic sources. Since the number of new cancer cases annually is of the order of 3 per 1,000 population, a household survey would be uneconomical, even if the informants knew the facts and were willing to relate them to an interviewer. Furthermore, when the inquiry requires detail on microscopic confirmation, histological type, primary site, and so on, medical records are the only reliable source of information.

Material drawn from diagnostic sources admittedly has shortcomings since the results are affected by the efficiency, accuracy, and

intensity of application of case-finding and diagnostic techniques by reporting hospitals and physicians. Inevitably, because of the failure of some persons to seek medical care even after symptoms appear, the true number of persons with cancer in the population will always be larger than the number diagnosed. This defect may be minimized by taking account of cancer cases not diagnosed until death. Even so, no precise measures of interarea or temporal differences in completeness of case-finding and diagnostic accuracy can be attempted in order to adjust the observed differences in frequency of illness. Evidence on the possible effects of differences in case finding and diagnosis must be drawn principally from examination of the internal relationships and consistency of the data.

In view of the high proportion of microscopically confirmed cases in this series, the presence of some cases incorrectly diagnosed on a clinical basis would not greatly distort the findings. The effect of inclusion of these cases on incidence and prevalence rates by individual

Figure 3. Cancer incidence, prevalence, and mortality rates (crude and age-adjusted) for urban and rural areas, by sex.



[1] Rates adjusted for age on total population of United States, 1950.

sites for the total population would be less than that indicated by the total proportion of incorrect diagnoses since some of the errors would be compensatory, the inclusion of some "false positives" partially balancing for the exclusion of "false negatives."

The classic epidemiological method, applicable to any disease, calls for the determination and comparison of frequencies of disease occurrence in defined population groups. For direct computation of attack rates, the size of the population at risk must be known. This approach avoids uncertainties of interpretation associated with the presentation of relative frequency data encountered often in necropsy studies, in which a high percentage for a single site may result either from high incidence for that site or low incidence for other sites. The epidemiological model has been followed in this study by collecting information on all diagnosed cancer cases among residents of Iowa, an area for which adequate population data were available. At the time of the 1950 census, the enumerated population of Iowa was 2,621,073: males, 1,310,283; females, 1,310,790. In urban areas—incorporated places of 2,500 population or more—there were 594,866 males and 634,567 females; in rural areas, the corresponding figures were 715,417 and 676,223.

Incidence, prevalence, and mortality, the three most widely used indexes for measuring the frequency of disease in the population, were defined as follows:

1. Incidence—Number of cases first diagnosed during the study year, including cases for which the medical certification of death was the first known diagnosis, per 100,000 population.

2. Prevalence—Number of persons known to have had cancer at any time during the year, per 100,000 population.

3. Mortality—Number of deaths during the year for which the primary cause of death was cancer, per 100,000 population.

The use of incidence as an index of the frequency of disease has certain advantages over the other two measures. Incidence is more accurately determined than prevalence, since cases diagnosed during the study year can be more completely enumerated than those remaining under treatment from earlier years. Mortality rates have the drawback of distorting the relative importance of the primary sites because of the great variation in survival and cure rates by site. The major emphasis in this report has been placed on incidence rates.

Findings

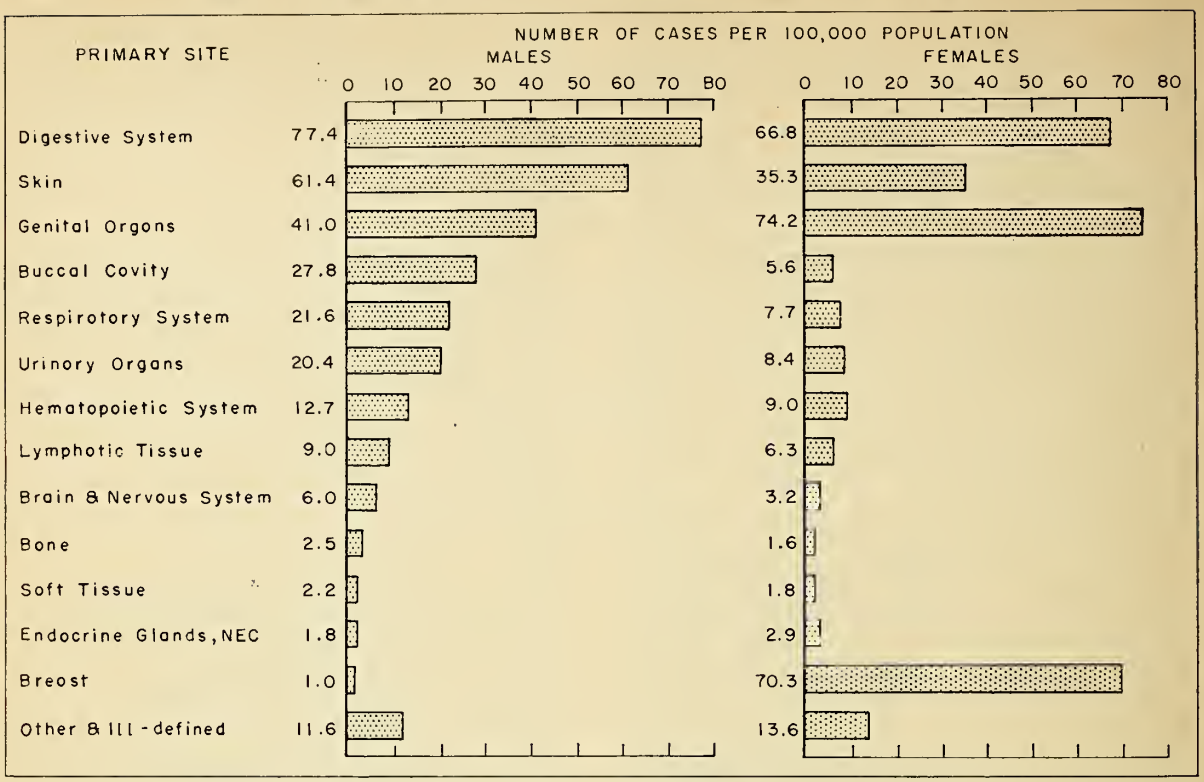
The crude cancer illness rates per 100,000 population, observed in Iowa for 1950, are: incidence, 347; prevalence, 509; mortality, 154. The incidence and prevalence rates were somewhat lower among males than among females, whereas the reverse held true for mortality. This relationship reflects sex differences in distribution by primary site and in survival experience, which will be discussed later.

For comparison with surveys elsewhere, it is desirable to adjust the rates to eliminate the effect of age composition of the population. Iowa has a relatively old population, and age adjustment (using the United States 1950 population as the standard) lowered the incidence rate for all sites in both urban and rural areas to 301 per 100,000 population (fig. 3). On the surface, it appears that a survey for an entire State, evenly divided between urban and rural populations, had produced a total cancer incidence rate not too far out of line with those reported in metropolitan areas. The total incidence for cancer of all sites in Iowa agreed reasonably well with the 4 northern cities in the 1947–48 surveys (*1–10*); 301 cases per 100,000 population in Iowa compared with an incidence rate of 307 in the 4 northern cities combined.[2]

However, when skin cancers were excluded, the correspondence in rates became less. The Iowa incidence rate for cancer of all sites excluding skin (253) was 9 and 12 percent below the respective figures for the 4 northern cities (277) and for the combined 10 cities (286). This suggested that lower incidence

[2] The age-adjusted incidence rates (all sites) for the 10 cities were as follows: North—total, 307; Chicago, 298; Detroit, 294; Philadelphia, 339; Pittsburgh, 305; South—total, 406; Atlanta, 308; Birmingham, 451; Dallas, 441; New Orleans, 454; West—total, 398; Denver, 361; San Francisco, 410.

Figure 4. Age-adjusted cancer incidence rates,[1] by sex and primary site.


NUMBER OF CASES PER 100,000 POPULATION
PRIMARY SITE
MALES
FEMALES
0 10 20 30 40 50 60 70 80
Digestive System 77.4 66.8
Skin 61.4 35.3
Genital Organs 41.0 74.2
Buccal Cavity 27.8 5.6
Respiratory System 21.6 7.7
Urinary Organs 20.4 8.4
Hematopoietic System 12.7 9.0
Lymphatic Tissue 9.0 6.3
Brain & Nervous System 6.0 3.2
Bone 2.5 1.6
Soft Tissue 2.2 1.8
Endocrine Glands, NEC 1.8 2.9
Breast 1.0 70.3
Other & Ill-defined 11.6 13.6

[1] Rates adjusted for age on total population of United States, 1950.

in rural areas may have contributed to the more favorable overall experience for Iowa. Within the State, the age-adjusted urban incidence rate for all sites (350) was 37 percent greater than its rural counterpart (255), a result which would remain essentially unchanged if the comparison were presented for places over and under 10,000 population instead of for places over and under 2,500 population. There is a bias, discussed in the paragraph immediately following, which affects the urban and rural rates. When an appropriate correction is made, the urban-rural incidence differential drops to 31 percent and the Iowa urban incidence, scaled down by 3–5 percent, then falls more closely into line with the rate for the four northern cities.

Bias in Reporting Residence

On many types of records, urban residence tends to be over-reported because of confusion between residence in terms of political subdivisions and of post office address.[3] For example, areas adjacent to cities may have city mailing addresses, and, unless special care is taken, they may be identified as being inside the cities. This source of error was eliminated from the 10-city surveys by checking street addresses against maps and census tract directories, a task which could not be undertaken systematically for Iowa cities in the absence of a complete set of maps and directories for all areas of the State. For birth certificates, overstatement of urban residence in the West North Central States, including Iowa, has been reported to be about 5 percent (*11*). Conversely, in Iowa, rural residence has been understated by 5 percent. Thus, the overall effect on Iowa urban-rural ratios of birth rates has been to inflate them about 10 percent above the true value.

Difficulties in ascertaining usual place of residence are most pronounced for births,

[3] Vital statistics and census data are reported in terms of political subdivisions.

Table 4. Age-adjusted [1] cancer incidence rates per 100,000 population, by primary site: Iowa, 1950, by sex; 10 urban areas, white persons, 1947

Primary site	Iowa, 1950			10 urban areas 1947 [2]
	Total	Male	Female	
All sites	300. 7	296. 4	306. 7	333. 2
Buccal cavity and pharynx	16. 4	27. 8	5. 6	13. 3
Lip	8. 6	16. 4	1. 0	3. 2
Tongue	1. 0	1. 4	. 7	2. 6
Salivary glands	2. 3	2. 4	2. 2	2. 1
Mouth, other	2. 9	4. 8	1. 2	2. 9
Pharynx	1. 6	2. 8	. 5	2. 5
Digestive system	71. 9	77. 4	66. 8	94. 2
Esophagus	1. 9	3. 0	. 9	4. 9
Stomach	19. 0	24. 7	13. 6	25. 8
Small intestine	1. 0	1. 3	. 7	. 8
Large intestine	23. 5	21. 0	25. 9	27. 0
Rectum	12. 3	14. 2	10. 5	18. 4
Liver	3. 9	3. 5	4. 3	4. 6
Gall bladder and biliary passages	2. 7	1. 6	3. 9	3. 4
Pancreas	6. 0	6. 9	5. 1	7. 3
Other digestive	1. 6	1. 2	1. 9	2. 0
Respiratory system	14. 6	21. 6	7. 7	23. 0
Larynx	1. 3	2. 1	. 5	4. 0
Lung and bronchus	12. 6	18. 8	6. 6	17. 7
Other	. 7	. 7	. 6	1. 3
Breast	36. 1	1. 0	70. 3	37. 9
Female genital organs	37. 5	------	74. 2	38. 0
Cervix uteri	17. 0	------	33. 4	16. 7
Corpus uteri	5. 5	------	11. 0	5. 2
Uterus, other and unspecified	5. 9	------	11. 7	6. 9
Ovary	6. 9	------	13. 6	7. 5
Other female genital organs	2. 2	------	4. 5	1. 7
Male genital organs	19. 8	41. 0	------	17. 4
Prostate	17. 2	35. 8	------	15. 6
Other male genital organs	2. 6	5. 2	------	1. 8
Urinary organs	14. 3	20. 4	8. 4	17. 6
Kidney	3. 5	4. 1	3. 0	4. 4
Bladder	10. 5	16. 2	5. 0	12. 9
Other urinary	. 3	. 1	. 4	. 3
Skin	48. 0	61. 4	35. 3	47. 3
Lip	2. 8	4. 3	1. 3	3. 0
Face, other	30. 9	39. 6	23. 0	35. 7
Scalp and neck	3. 9	4. 7	3. 1	------
Upper limbs	3. 7	5. 3	2. 1	3. 0
Trunk and lower limbs	3. 6	3. 4	3. 7	4. 6
Skin, other	3. 1	4. 1	2. 1	1. 0
Eye	. 5	. 8	. 3	------
Brain and nervous system	4. 6	6. 0	3. 2	6. 1
Brain	4. 1	5. 6	2. 7	4. 9
Other nervous system	. 5	. 4	. 5	1. 2
Endocrine glands [3]	2. 4	1. 8	2. 9	2. 9
Thyroid	2. 1	1. 4	2. 6	2. 3
Other endocrines	. 3	. 4	. 3	. 6
Bone	2. 0	2. 5	1. 6	2. 1
Soft tissue	2. 0	2. 2	1. 8	2. 0
Lymphatic tissue	7. 6	9. 0	6. 3	[4]
Hematopoietic system	10. 9	12. 7	9. 0	[5]
Ill-defined sites	12. 1	10. 8	13. 3	14. 7

[1] Rates adjusted for age on the total population of the United States, 1950.

[2] Surveys conducted by the National Cancer Institute (*1–10*).

[3] Not elsewhere classified.

[4] Comparable data not available. In coding primary sites for the 10 urban areas, all cases with tumors of lymphatic tissue were coded as lymphomas, even if a specific organ of origin was reported. In the Iowa data, such cases were coded to the site of origin.

[5] Comparable data not available. In the Iowa data the site group "hematopoietic system" includes spleen. In the 10-city data, a malignancy of the spleen involving lymphatic tissue was coded to "lymphoma"; all other malignancies of the spleen were coded to "other and unspecified sites."

nearly all of which now occur in hospitals. Specific information on this bias for death certificates and other medical records involving cancer is not available. A reasonable estimate, however, would place the magnitude of the effect of erroneous reporting of urban residence on death certificates in Iowa as about half that for births—it is known, for example, that half the cancer deaths in Iowa occur at home, [4] thus insuring an accurate report of residence in these cases.

The effect of this error may be estimated in another way. County of residence is almost always stated correctly on the death certificate. The ratio of age-adjusted cancer incidence rates between metropolitan and nonmetropolitan

[4] National Office of Vital Statistics: Unpublished tabulations for 1948.

counties was 1.12, which may be accepted as a lower limit of the urban-rural ratio. Since the distribution of urban and rural populations within both types of counties is known, a simple equation will estimate the urban-rural ratio, assuming that urban and rural incidence rates are the same in both categories of counties. This resulted in an estimated urban-rural ratio of 1.31, which, when compared with the observed ratio of 1.37, implied an overstatement in urban residence of about 3 percent. Thus, the estimates of the probable size of the bias, from the two approaches discussed, appear quite consistent.

Primary Site

Among Iowa males, cancer occurred most frequently in the digestive system, skin, genital organs, buccal cavity, and respiratory system. Among females, the order was genital organs, breast, digestive system, and skin (fig. 4). The leading specific sites for males were prostate, stomach, large intestine, and lung; for females, cervix and large intestine followed breast. The age-adjusted rates for detailed sites are given in table 4 and are compared with the corresponding 10-city data for white persons.

Some comparisons with the 10-city data appeared striking. The Iowa incidence of cancer of the digestive system—specifically, of stomach, rectum, and possibly esophagus—ran well below the 10-city experience. The low rate for cancer of the stomach cannot be ascribed to classification shifts among the various parts of the digestive system. The Iowa rates were also lower for the respiratory system, including both larynx and lung and bronchus. The incidence of cancer of the buccal cavity was high due to the rate for the lip. The Iowa rate for lip cancer ranked with the highest rate found among any of the 10 cities. Agreement between the Iowa and 10-city data on incidence of cancer of the breast and female genital organs was good. When urban Iowa experience was compared with the experience in the 10 cities, incidence of cancer of the digestive system, including the 3 individual sites named, still fell below the 10-city average. The incidence of laryngeal cancer also remained low, but the urban Iowa lung and bronchus rate came into line with the 10-city findings.

Mortality data by primary site will be found in text table 21 and prevalence data, in appendix table 6.

Microscopically Confirmed Cases

In cancer studies, some pathologists and clinicians prefer to consider only microscopically confirmed cases, since they feel the inclusion of data on less accurately diagnosed cases may lead to erroneous inferences. This is a view strongly enough held to justify the presentation here of data for microscopically confirmed cases only (appendix tables 3 and 5). Because of selection factors associated with hospital admissions or treatment, the restriction of data to microscopically confirmed cases may yield data for a single hospital which are seriously unrepresentative. However, this bias is minimized by surveying all diagnostic and treatment sources for a given area. The point to be emphasized for the Iowa survey is that

Table 5. Sex ratios [1] of cancer incidence for total newly diagnosed cases and for microscopically confirmed cases only, by site

Primary site	Ratio: Male/female	
	Total newly diagnosed cases	Microscopically confirmed cases only
All sites	0. 97	0. 85
Buccal cavity and pharynx	4. 96	4. 06
Lip	16. 40	13. 88
Digestive system	1. 16	1. 13
Stomach	1. 82	1. 98
Large intestine	. 81	. 78
Rectum	1. 35	1. 35
Respiratory system	2. 81	3. 91
Lung and bronchus	2. 85	4. 15
Breast	. 01	. 01
Urinary organs	2. 43	2. 84
Bladder	3. 24	3. 92
Skin	1. 74	1. 67
Brain and nervous system	1. 88	1. 50
Endocrine glands [2]	. 62	. 67
Bone	1. 56	1. 88
Soft tissue	1. 22	1. 25
Lymphatic tissue	1. 43	1. 31
Hematopoietic system	1. 41	1. 50
Other and ill-defined sites	. 85	. 88

[1] Based on number of cases per 100,000 population, adjusted for age on the total population of the United States, 1950.
[2] Not elsewhere classified.

most comparisons and inferences remained essentially unchanged, whether based on the total newly diagnosed cases or solely on cases meeting exacting diagnostic criteria. The sex ratios by site (table 5) and comparisons of age and urban and rural distributions (discussed later) turned out to be almost identical for the two diagnostic bases employed. This result may support the position of some statisticians, who point out that the effect of including a small proportion of possibly inaccurately diagnosed cases is usually to dilute the degree of relationships but not to exaggerate them nor to create fictitious ones.

In relating microscopically confirmed cases to population at risk, incidence is invariably understated. Appendix table 5 has been labeled modestly, not as "incidence," but as "microscopically confirmed cases per 100,000 population."

Urban-Rural Differences in Cancer Incidence

The present study provided the first application of morbidity survey techniques to an entire State, embracing both urban and rural populations. The field experience indicated that problems of collecting data in urban and rural areas were similar in kind and that reports could be collected successfully from rural physicians and from rural hospitals.

Most urban-rural and related occupational comparisons of cancer experience have in the past been derived from mortality data. The British Registrar-General has been the most prolific source of information. In addition to occasional publications from that office, data for some sites have been worked up and presented by individual investigators (*12–19*). The pioneer American data were prepared from mortality records by Gover (*20*). The National Office of Vital Statistics has since published further analyses of urban-rural differentials in cancer mortality (*21, 22*). From the records of the Danish cancer registry, Clemmesen has contrasted morbidity and mortality in Copenhagen with that in provincial towns and rural areas (*23–25*). The Connecticut State Health Department cancer register to date has not incorporated age adjustments in their reports of urban and rural incidence; age-adjusted data will soon be available from that source (*26*).

Even when incorrect classification of residence (already discussed) is allowed for, sizable differentials in Iowa between urban and rural incidence remain for some cancer sites. Do such differences reflect real variation in levels of risk between urban and rural populations or are they artifacts introduced by extraneous causes? No direct demonstration of the effect of two other possibilities, differences in diagnostic levels or selective migration of ill people to urban areas, can be advanced. Several lines of indirect evidence, based partly on examination of the data for internal consistency, which may be adduced to support the hypothesis of real urban-rural differentials, are summarized below:

1. Several observers familiar with medical practice in Iowa are convinced that rural residents have access to medical care of the same quality provided city residents. The referral of patients requiring highly specialized diagnosis and treatment to the University of Iowa Hospital has been an important equalizing factor. This impression is fortified by the survey findings, which show basic similarity between urban and rural experience with respect to the proportion of cases receiving hospital care, cases with microscopic confirmation, and cases recorded from death certificates; the distribution by stage at diagnosis; and survival experience. Collectively these indexes suggest the same level of case-finding activities in urban and rural areas. They seem incompatible with the suggestion that rural cases may be discovered later in the course of the disease than urban cases or not until death.

2. Incidence rates for rural areas in metropolitan counties and adjacent to large cities were no higher than for rural areas in the more remote nonmetropolitan counties.

3. Variation in incidence among seven Iowa

Table 6. Age-adjusted cancer incidence rates [1] per 100,000 population, Iowa, by primary site and sex, for urban [2] and rural areas [3]

Primary site	Both sexes		Male		Female		Ratio: Urban/rural [4]		
	Urban	Rural	Urban	Rural	Urban	Rural	Both sexes	Male	Female
All sites	349. 6	255. 3	350. 6	250. 2	351. 6	261. 5	1. 37	1. 40	1. 34
Buccal cavity and pharynx	18. 7	14. 4	32. 1	24. 1	7. 2	4. 1	1. 30	1. 33	1. 76
Lip	8. 6	8. 5	17. 3	15. 7	1. 2	. 8	1. 01	1. 10	1. 50
Tongue	1. 2	. 9	1. 6	1. 1	. 8	. 7	1. 33	1. 45	1. 14
Salivary glands	2. 8	1. 9	2. 9	2. 1	2. 7	1. 6	1. 47	1. 38	1. 69
Mouth, other	3. 9	2. 0	6. 0	3. 7	2. 1	. 3	1. 95	1. 62	7. 00
Pharynx	2. 2	1. 1	4. 3	1. 5	. 4	. 7	2. 00	2. 87	. 57
Digestive system	77. 2	67. 0	87. 6	68. 7	68. 5	65. 2	1. 15	1. 28	1. 05
Esophagus	2. 2	1. 7	3. 9	2. 1	. 6	1. 2	1. 29	1. 86	. 50
Stomach	18. 3	19. 5	24. 7	24. 7	13. 1	14. 1	. 94	1. 00	. 93
Small intestine	1. 3	. 8	1. 5	1. 2	1. 0	. 5	1. 62	1. 25	2. 00
Large intestine	26. 9	20. 3	25. 4	17. 4	28. 3	23. 3	1. 33	1. 46	1. 21
Rectum	12. 8	11. 7	16. 3	12. 4	10. 0	11. 0	1. 09	1. 31	. 91
Liver	3. 8	4. 1	3. 9	3. 2	3. 7	5. 1	. 93	1. 22	. 73
Gall bladder and biliary passages	2. 9	2. 6	1. 4	1. 7	4. 2	3. 6	1. 12	. 82	1. 17
Pancreas	7. 3	4. 8	9. 0	5. 1	5. 7	4. 4	1. 52	1. 76	1. 30
Other digestive	1. 7	1. 5	1. 5	. 9	1. 9	2. 0	1. 13	1. 67	. 95
Respiratory system	20. 2	9. 3	32. 8	12. 1	9. 0	6. 3	*2. 17	*2. 71	1. 43
Larynx	1. 9	. 7	2. 9	1. 4	. 9	0	2. 71	2. 07	-------
Lung and bronchus	17. 7	7. 9	29. 0	10. 2	7. 8	5. 3	*2. 24	*2. 84	1. 47
Other respiratory	. 6	. 7	. 9	. 5	. 3	1. 0	. 86	1. 8	. 30
Breast	42. 1	30. 6	1. 5	. 7	78. 0	62. 4	*1. 38	2. 14	1. 25
Female genital organs	-------	-------	-------	-------	88. 7	59. 8	-------	-------	*1. 48
Cervix uteri	-------	-------	-------	-------	43. 4	23. 6	-------	-------	*1. 84
Corpus uteri	-------	-------	-------	-------	11. 0	10. 9	-------	-------	1. 01
Uterus, other and unspecified [5]	-------	-------	-------	-------	14. 0	9. 4	-------	-------	1. 49
Ovary	-------	-------	-------	-------	15. 1	12. 3	-------	-------	1. 23
Other female genital organs	-------	-------	-------	-------	5. 2	3. 6	-------	-------	1. 44
Male genital organs	-------	-------	43. 5	39. 0	-------	-------	-------	1. 12	-------
Prostate	-------	-------	37. 8	34. 2	-------	-------	-------	1. 11	-------
Other male genital organs	-------	-------	5. 7	4. 8	-------	-------	-------	1. 19	-------

See footnotes at end of table.

regions was smaller than that observed between urban and rural areas. For several cancer sites, the observed regional variation might be accounted for by chance deviations from State rates. The urban-rural differences noted cannot be ascribed to a systematic regional effect.

4. Within Iowa, the urban-rural differentials in the morbidity data were generally consistent, site by site, with those computed from mortality data. Similar differentials in cancer mortality have been found in statistics for other areas (*21*, *22*). Similar differentials in cancer morbidity, for several sites, have been observed in the Danish cancer register (*23*).

5. Anomalies in cancer incidence for some sites are hard to explain on diagnostic grounds. They include the sizable urban-rural difference for cervix, not duplicated for corpus; the urban-rural concordance in rates for male genital organs and the disparity in rates for female genital organs; the marked sex difference in the urban-rural ratios for lung and bronchus; the smaller urban-rural ratios for stomach and large intestine, relatively inaccessible sites, than for breast, an accessible site.

6. Urban-rural differentials increase with advancing age for certain sites, such as respiratory system, buccal cavity, and skin. It is difficult to see why diagnostic differences should be selective with respect to both age and

Table 6. Age-adjusted cancer incidence rates [1] per 100,000 population, Iowa, by primary site and sex, for urban [2] and rural areas [3]—Continued

Primary site	Both sexes		Male		Female		Ratio: Urban/Rural [4]		
	Urban	Rural	Urban	Rural	Urban	Rural	Both sexes	Male	Female
Urinary organs	17. 3	11. 4	25. 1	16. 5	10. 6	6. 1	1. 52	1. 52	1. 74
Kidney	4. 0	3. 1	4. 8	3. 5	3. 3	2. 8	1. 29	1. 37	1. 18
Bladder	12. 9	8. 2	20. 2	12. 9	6. 6	3. 2	1. 57	1. 57	2. 06
Other urinary	. 4	. 1	. 1	. 1	. 7	. 1	4. 00	1. 00	7. 00
Skin	57. 7	38. 9	72. 1	52. 1	45. 4	24. 9	*1. 48	1. 38	*1. 82
Lip	2. 8	2. 7	4. 6	4. 0	1. 3	1. 4	1. 04	1. 15	. 93
Face, other	37. 6	25. 0	47. 3	32. 8	29. 2	16. 5	*1. 50	1. 44	*1. 77
Scalp and neck	4. 9	2. 9	5. 7	3. 8	4. 4	1. 9	1. 69	1. 50	2. 32
Upper limbs	4. 2	3. 2	5. 8	4. 9	2. 8	1. 4	1. 31	1. 18	2. 00
Trunk and lower limbs	4. 6	2. 6	3. 9	3. 1	5. 1	2. 2	1. 77	1. 26	2. 32
Skin, other	3. 6	2. 5	4. 8	3. 5	2. 6	1. 5	1. 44	1. 37	1. 73
Eye	. 5	. 5	. 5	1. 0	. 5	. 1	1. 00	. 50	5. 00
Brain and nervous system	5. 7	3. 6	7. 9	4. 5	3. 7	2. 6	1. 58	1. 76	1. 42
Brain	5. 1	3. 3	7. 4	4. 1	3. 0	2. 3	1. 55	1. 80	1. 30
Other nervous system	. 6	. 3	. 5	. 4	. 7	. 3	2. 00	1. 25	2. 33
Endocrine glands [6]	2. 9	1. 9	2. 2	1. 4	3. 5	2. 4	1. 53	1. 57	1. 46
Thyroid	2. 7	1. 5	2. 0	. 9	3. 2	2. 1	1. 80	2. 22	1. 52
Other endocrines	. 2	. 4	. 2	. 5	. 3	. 3	. 50	. 40	1. 00
Bone	2. 1	1. 9	2. 6	2. 3	1. 6	1. 6	1. 11	1. 13	1. 00
Soft tissue	2. 1	1. 9	2. 8	1. 6	1. 4	2. 2	1. 11	1. 75	. 64
Lymphatic tissue	9. 6	5. 8	12. 2	6. 1	7. 2	5. 5	*1. 66	*2. 00	1. 31
Hematopoietic system	12. 7	9. 3	14. 4	11. 4	10. 9	7. 2	1. 37	1. 26	1. 51
Ill-defined sites	14. 4	9. 9	13. 3	8. 7	15. 4	11. 1	1. 45	1. 53	1. 39

[1] Rates adjusted for age on the total population of the United States, 1950.
[2] "Urban" includes all incorporated places of 2,500 population and over.
[3] Rates for urban and rural areas have not been adjusted to correct for bias in reporting place of residence on medical records.
[4] The sites marked with an asterisk collectively have statistically significant urban-rural differences at about the .05 probability level; i. e., inferences for the composite list would be considered incorrect if untrue for any component part.
[5] Included were 4 cases of other parts of the uterus (International List No. 173).
[6] Not elsewhere classified.

site. The fact that this widening of the urban-rural differential does not appear consistently for a variety of sites would argue against the selective migration of ill, elderly persons to urban areas as a likely explanation.

High mobility complicates population classification for studies of urban-rural differences in Iowa (and the United States) to a greater degree than elsewhere, particularly when collected data define place of residence as of the time of observation and do not reflect previous residence history. Future studies may rule out more positively the selective migration of ill persons to cities as an important cause of urban-rural differentials. This theory may be tested directly by gathering detailed residence histories on samples of urban and rural cases to determine net migration balances, which can be compared with data from the population census or from a series of controls.

Urban and rural age-adjusted incidence rates with their ratios are presented for detailed sites in table 6. In view of the discussion of the possible effect of systematic misreporting of place of residence, the conservative course would be not to assert the existence of urban-rural differences for any site, unless the ratio of the rates is significantly greater than 1:1. Certain sites have statistically significant urban-rural differences at about the .05 probability

Table 7. Urban-rural ratios [1] of cancer incidence, microscopically confirmed cases only, by site

Primary site	Ratio: Urban/rural		
	Both sexes	Males	Females
All sites	1. 47	1. 53	1. 41
Buccal cavity and pharynx	1. 32	1. 34	1. 68
Lip	1. 03	1. 08	1. 67
Digestive system	1. 28	1. 46	1. 13
Stomach	1. 17	1. 26	1. 16
Large intestine	1. 37	1. 48	1. 28
Rectum	1. 10	1. 37	. 85
Respiratory system	2. 15	2. 53	1. 48
Lung and bronchus	2. 32	2. 80	1. 41
Breast	1. 38	2. 20	1. 26
Female genital organs	1. 64	------	1. 50
Cervix uteri	1. 97	------	1. 83
Corpus uteri	1. 06	------	. 96
Uterus, other and unspecified	2. 00	------	1. 77
Ovary	1. 42	------	1. 31
Male genital organs	1. 19	1. 34	------
Prostate	1. 15	1. 31	------
Urinary organs	1. 52	1. 59	1. 60
Bladder	1. 56	1. 60	1. 96
Skin	1. 64	1. 49	2. 10
Brain and nervous system	1. 86	2. 36	1. 40
Endocrine glands [2]	1. 86	2. 20	1. 67
Bone	1. 67	2. 10	1. 28
Soft tissue	1. 06	1. 73	. 57
Lymphatic tissue	1. 65	1. 91	1. 41
Hematopoietic system	1. 32	1. 23	1. 53
Other and ill-defined sites	1. 52	1. 52	1. 52

[1] Rates for urban and rural areas have not been adjusted to correct for bias in reporting place of residence on medical records.
[2] Not elsewhere classified.

level; that is, the inferences for the composite list would be considered incorrect if untrue for any component part (table 6). Other sites would be significant at the .05 level, if tested individually. However, in testing individual sites at the .05 level, one must be prepared to accept a much greater risk of false inference of significant difference for at least some sites, because of the large number of contrasts available.

Microscopically Confirmed Cases

Restriction of the urban-rural comparisons to microscopically confirmed cases would have left inferences drawn from examination of the data fundamentally unchanged. The urban and rural age-specific rates for this category are presented in appendix table 3; ratios for microscopically confirmed cases are given in table 7 for selected sites. Inspection reveals that the ratios of the rates for microscopically confirmed cases for urban and rural residents differ little from the urban-rural ratios for total newly diagnosed cases reported in table 6.

Variation by Type of County and Region

Urban and rural age-adjusted incidence rates for all sites and for five large site groups have been further subdivided in table 8, for metropolitan and nonmetropolitan counties. The general agreement in the corresponding figures between the two types of counties indicates that the urban-rural differentials are widespread throughout the State and are not concentrated in a few selected counties. The data are not extensive enough to permit examination for gradients within urban areas of varying size.

Table 9 summarizes the regional variation in incidence for selected site groups. The "indirect method" was used to adjust for the effect of age and urban-rural status; the results are presented in the form of standard incidence ratios, with the statewide incidence being equated to a base of 100 and the regional figures expressed as percentages thereof.

The typical range in values for regional departures from State experience for the site groups considered was on the order of ±15–25 percent. For all sites combined, the regional variation was greater than could be accounted for by chance fluctuations alone. Most of this was contributed by a single site, skin. For the other site-and-sex groups listed, excepting female genital organs and the respiratory system in females, the regional variation could well be attributed to chance fluctuations. The point to be emphasized is that for several numerically important site groups there appeared to be no systematic regional variation of consequence.

This regional stability for incidence data persisted for most site groups when the results for urban and rural areas were examined separately. This would seem to enhance the significance to be attached to the urban-rural

Table 8. Age-adjusted [1] cancer incidence rates per 100,000 population, for selected primary sites, urban and rural areas in metropolitan and nonmetropolitan counties in Iowa

Type of county, urban and rural areas	All sites	Digestive system	Lung and bronchus	Breast [2]	Male genital organs	Female genital organs
Metropolitan counties [3]	326. 3	75. 5	18. 3	34. 9	37. 7	84. 6
Urban [4]	348. 8	79. 0	20. 9	37. 2	40. 4	90. 3
Rural	234. 1	60. 5	7. 5	25. 7	27. 7	59. 7
Nonmetropolitan counties	283. 7	69. 3	10. 4	35. 8	41. 3	68. 4
Urban	339. 2	73. 8	15. 1	44. 9	44. 2	84. 2
Rural	251. 6	66. 9	7. 5	30. 5	39. 7	58. 5

[1] Adjusted for age on the total population of the United States, 1950.
[2] Both sexes included.
[3] Includes counties within standard metropolitan areas as defined by the U. S. Bureau of the Census (Black Hawk, Linn, Polk, Scott, and Woodbury Counties).
[4] Incorporated places of 2,500 population and over.

NOTE: Rates for urban and rural areas have not been adjusted to correct for bias in reporting place of residence on medical records.

differences observed. Conversely, the regional variation for incidence of cancer of the skin in both urban and rural areas makes the urban-rural difference for that site a little suspect despite the sizable gradient observed. Systematic differences among physicians in diagnosing and reporting skin lesions, removed without tissue submitted for histological diagnosis, could be responsible for some regional variation. However, when only microscopically confirmed skin cancer cases are considered, regional variation was still prominent.

For certain sites for which etiologies of endogenous origin are suspected (such as most organs of the digestive system, and the prostate) it may be noteworthy that no significant regional variation was found. Absence of both pronounced urban-rural differentials and regional variation would be consistent with nonenvironmental etiologies. For other sites, with pronounced urban-rural differentials and possible environmental etiologies (respiratory system, urinary organs), the lack of significant residual regional variation may lend support to the idea that the responsible carcinogens are identified closely with some facet of urban life.

Inspection of the standard incidence ratios suggests that region 1 tended to have high incidence and region 4, low incidence, for several sites. The present fragmentary data do not warrant speculation on the specific factors which may shape the regional pattern for any site. For that purpose, information would have to be accumulated over a series of years.

Buccal Cavity

Examination of data from a variety of sources suggests that the sex distribution is the most striking feature for cancer of the buccal cavity; all primary sites within this category, with the exception of salivary glands, show much higher rates among males. The Iowa incidence rates conformed to this pattern and indicated further that these sex relationships held in both urban and rural populations.

Excessive intraoral cancer rates have been recognized for certain specific exposures, for example, betel nut chewing, which lend credence to the possibility of other unrecognized environmental carcinogenic agents. While the urban-rural incidence ratios for the buccal cavity do not meet the most exacting tests of statistical significance, urban-rural differences were observed, and the possible role of other etiologies in influencing the distribution of cases should be considered. Etiological possibilities advanced in the literature, which could conceivably affect the distribution within Iowa, include syphilis (*27*), alcohol consumption (*28*), smoking (*29*), and carious teeth and improperly fitted dentures (*30*).

One of these etiological possibilities, syphilis, seems an unlikely candidate to produce the urban-rural differences observed. Selective serv-

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Table 9. Regional variation in cancer incidence: selected site groups, for males and females, Iowa

Primary site	Total	Region							Probability [1] that observed regional variation may have occurred by chance
		1	2	3	4	5	6	7	
	Male								
All sites:									
Observed cases [2]	4, 449	636	516	506	412	1, 101	759	519	
Standard incidence ratio [3]	100	114	100	86	91	107	104	91	P<. 001
All sites, excluding skin:									
Observed cases	3, 536	498	419	410	332	807	631	439	
Standard incidence ratio	100	112	103	88	92	98	108	96	.002<P<.005
Buccal cavity and pharynx:									
Observed cases	408	44	57	53	36	91	85	42	
Standard incidence ratio	100	85	120	99	87	96	127	80	.05<P<.10
Digestive system:									
Observed cases	1, 189	170	131	133	107	280	216	152	
Standard incidence ratio	100	114	95	85	87	102	110	101	.05<P<.10
Respiratory system:									
Observed cases	317	49	32	28	35	82	44	47	
Standard incidence ratio	100	123	93	69	117	109	86	102	P>. 10
Genital organs:									
Observed cases	647	86	85	86	54	151	117	68	
Standard incidence ratio	100	107	111	101	80	101	108	86	P>. 10
Urinary organs:									
Observed cases	307	48	40	40	22	57	52	48	
Standard incidence ratio	100	125	114	100	71	80	103	120	P>. 10
Skin:									
Observed cases	913	138	97	96	80	294	128	80	
Standard incidence ratio	100	120	92	80	86	139	85	68	P<. 001
	Female								
All sites:									
Observed cases	4, 639	669	533	557	408	1, 145	755	572	
Standard incidence ratio	100	120	103	90	88	104	98	94	P<. 001
All sites, excluding skin:									
Observed cases	4, 089	587	473	501	369	968	673	518	
Standard incidence ratio	100	119	103	92	90	100	99	97	P<. 001
Buccal cavity and pharynx:									
Observed cases	82	18	14	10	5	19	9	7	
Standard incidence ratio	100	182	157	92	63	97	67	63	.02<P<.05
Digestive system:									
Observed cases	1, 095	149	128	146	100	252	181	139	
Standard incidence ratio	100	115	103	100	88	97	98	101	P>. 10
Respiratory system:									
Observed cases	120	28	12	11	15	30	14	10	
Standard incidence ratio	100	195	90	69	124	105	70	63	.002<P<.005
Breast:									
Observed cases	1, 032	127	132	131	103	232	153	154	
Standard incidence ratio	100	101	114	96	99	95	90	115	P>. 10
Genital organs:									
Observed cases	1, 058	147	103	105	89	278	205	131	
Standard incidence ratio	100	113	88	75	86	110	118	93	P<. 001
Urinary organs:									
Observed cases	132	19	21	19	8	25	23	17	
Standard incidence ratio	100	122	147	109	62	79	104	95	P>. 10
Skin:									
Observed cases	550	82	60	56	39	177	82	54	
Standard incidence ratio	100	127	101	77	73	134	89	72	P<. 001

[1] Based on chi-square test for significance.

[2] Newly diagnosed cases.

[3] The standard incidence ratio is an index of regional cancer incidence adjusted for age and urban-rural residence (incidence for total Iowa=100). It is the ratio of the observed number of newly diagnosed cases in the region to the expected number computed by applying the State age-specific urban and rural incidence rates to the regional populations.

ice examinations indicated that the prevalence of syphilis in Iowa was low and in terms of rates, not marked by a numerically large urban-rural gradient (*31*). Considering the Iowa medical care pattern, urban-rural differences in the prevalence of poor dentures and jagged teeth also should not be great enough to produce a sizable urban-rural effect, even if this etiology were fully established. The smoking and alcohol consumption hypotheses are not patently inconsistent with the observed urban-rural effects. It is conceivable that surveys would establish important urban-rural differences for these latter two characteristics. Such consistent findings, of course, would not, of themselves, establish etiology. One of the further steps would have to be the direct demonstration of differences in risk in populations classified with respect to tobacco and alcohol consumption.

Digestive System

In the analysis of United States mortality data for 1940, Spiegelman (*21*) found that cancer of the digestive organs showed the largest urban-rural differentials, aside from the group of residual sites. He ventured the opinion that this was probably due to poorer diagnostic facilities in rural areas than in urban areas. This situation was not duplicated in England and Wales for at least one important site within the system, where Stocks (*12*) reported "that death rates from cancer of all sites are graded even more steeply with increasing urbanization than are the rates at the same ages for stomach cancer." In reviewing necropsy evidence for the large intestine and rectum, Steiner (*32*) remarked, "the data here presented on the racial frequencies speak conclusively neither for environmental nor for genetical factors." His survey also uncovered no promising leads on environmental factors for stomach, gall bladder, or liver; and reserved the possibility that exogenous agents could play a role in producing esophageal and pancreatic tumors. The most suggestive epidemiological data now available for the digestive system relate to gastric cancer; the high mortality rates among Japanese (*33*); and persisting mortality differentials by socioeconomic class (*19*). The factors underlying these two observations could not be expected to yield urban-rural differentials in Iowa.

The urban-rural incidence differentials in Iowa were smaller for digestive system than for any other numerically important site group and seemed consistent with the experience of the Danish cancer register (*23*). The Iowa material agreed better with impressions from autopsy series on the probable importance of endogenous as opposed to exogenous factors than with many previously published mortality analyses. The Iowa finding of relative urban-rural uniformity for a group of the more inaccessible sites (where problems of diagnosis would be more difficult) enhances the confidence one may place in the reality of the differences for some of the accessible sites.

Larynx

Cancer of the larynx showed an urban-rural incidence ratio resembling that for cancer of the lung and bronchus. Despite the small number of cases of cancer of the larynx in the Iowa survey one may expect the observation to be confirmed by other studies. None of the alleged local precursors listed by Steiner (*32*)—tuberculosis, syphilis, X-radiation, excessive voice use—should produce large urban-rural differences in Iowa, and an explanation for this phenomenon needs to be sought elsewhere. Exposure to airborne carcinogens, including the possibility of tobacco smoke, is one hypothesis which could be compatible with the distribution observed in Iowa.

Lung and Bronchus

The urban-rural disparity in lung cancer incidence is so great, particularly for males, that it is difficult to conceive of an explanation not accepting a true difference in risk. Similar findings from mortality data are well known and have provided part of the evidence for the atmospheric pollution theory of carcinogenesis (*13, 16, 34*). The accompanying sex differences in both mortality and incidence make it necessary to postulate either special exposures for males or sex differences in response rates to accompany the atmospheric pollution

theory. One interesting aspect of the Iowa data is that they suggest larger sex differentials among urban as opposed to rural residents.

Another point to be noted is that the urban rate for nonmetropolitan counties lies between the urban and rural figures for metropolitan counties. This is not inconsistent with the air pollution theory since nonmetropolitan-urban areas are trading centers for the surrounding countryside, are not heavily industrialized, and do not have the physical characteristics of densely populated cities. This relationship, however, may prove to be entirely compatible with the smoking-lung cancer hypothesis, since some evidence indicates that data on the distribution of smoking habits, when obtained, are likely to show urban-rural differences. Two papers have suggested that lung cancer rates are similar with urban and rural populations for either smokers or nonsmokers (*29*, *35*). In view of the strong associations between smoking and lung cancer reported by many investigators (*36*, *37*), further studies of smoking patterns for population samples classified by place of residence should be pressed.

Breast

The urban excess of mammary cancer in Iowa was in accord with Danish register findings (*23*) and with some United States mortality data (*21*). Some studies have pointed out that breast cancer rates are higher among single women and childless married women (*38–40*). The urban-rural relationship fits into the pattern since the proportion of women in these two categories is lower in rural areas.

Female Genital Organs

In an analysis of United States mortality data for 1940, Spiegelman (*21*) found that cancer of the female genital organs had the smallest urban-rural differential of the site groups examined. Although the ratio even for this site group was sizable, 1.32, he discounted its significance because of the presumed poorer quality of medical certification in rural areas. The Iowa results, on the contrary, pinpointed female genital organs as exhibiting a significant urban-rural difference. In this respect, they agreed with the Danish experience reported by Clemmesen (*23*).

The urban-rural incidence ratios varied for specific sites, the ratio for cervix exceeding the ratios for corpus and ovary. Supporting data on mortality cannot be cited; many medical certifications of death do not specify the part of the uterus involved and hence are unsuitable for separate studies of cervix and corpus. In Iowa, two approaches for the allocation of unspecified uterus cases were attempted: (*a*) a followup of a sample to secure precise site information and (*b*) classification and distribution by histological type within age groups. Both methods yielded almost identical results. The age-adjusted incidence rates per 100,000 population for cervix and corpus, with allocation of unspecified uterus, follow:

Site	*Total*	*Urban*	*Rural*
Cervix	36.6	46.8	26.4
Corpus	19.3	21.2	17.3

Clinicians have noted variations in cervix-corpus ratios among certain population groups, the most common observation being the rarity of cervical cancer among Jewish women (*41–43*). The evidence suggests that this phenomenon may be attributed mainly to variations in incidence of cervical cancer, the incidence of corpus cancer remaining more stable. The urban-rural variation for cervix, but not for corpus, ties into the overall epidemiological pattern of variability for the former site. Unrepaired lacerations, uncircumcised marital partners, multiple spouses, first coitus at an early age, and race have been numbered among the items associated with high ratios for cancer of the cervix (*44*). However, child-bearing history does not seem to be associated (*45*). None of the possibilities advanced so far could account for the urban-rural differences in the incidence of cervical cancer noted in Iowa. A search for other factors more intimately connected with urban and rural environments seems warranted.

Prostate

The prostate accounts for most of the cancer incidence found in male genital organs. The striking feature of the Iowa data was the close

urban-rural agreement. The urban-rural correspondence was much better than that found in analyses of cancer mortality in the United States and provided a sharp contrast to the results for female organs.

The Iowa distribution for cancer of the prostate conformed well to the impressions of some pathologists. Steiner felt that within a given race there is little or no evidence that frequency of cancer of the prostate is influenced by migration, geography, or environmental factors (*32*). He also made the point that this tumor does not occur among castrates, indicating an endogenous hormonal factor. An etiology of nonenvironmental origin would be consistent with the absence of an urban-rural differential.

Urinary Organs

The Iowa incidence data for urinary organs, particularly the bladder, suggested an urban-rural contrast, even though the respective numbers of cases were not large enough to assure statistical significance. The role of certain chemicals used industrially, such as aniline, in the production of bladder cancer has been recognized. The population exposed to such special risks is small and this factor by itself could not be responsible for large urban-rural differences in the incidence of cancer of the urinary organs, especially for females. The two other etiological possibilities most frequently advanced in the literature, schistosome infection and stone (*32*), are not firmly established; and the former would certainly not be relevant to the problem of the Iowa differentials.

If further inquiries continue to reveal urban-rural differences for cancer of the urinary organs, epidemiological studies to locate more ubiquitous carcinogens and means of exposure than the traditionally considered industrial chemicals would be warranted.

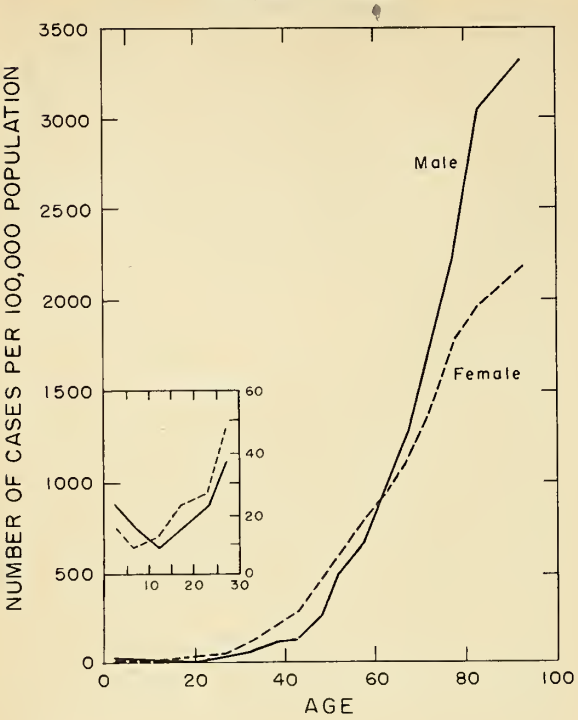
Future Studies

The existence of urban-rural differentials for certain cancer sites, while not established unequivocally, must be entertained seriously as a working hypothesis. Urbanization as a classification provides useful clues, which may contribute to the search for other more meaningful variables connected with the presence or absence of urban conditions. A present difficulty in cancer epidemiology is that much of the additional information required for classifying populations and events is not available from the usual standard sources of data. Two established avenues for acquiring more appropriately classified data exist: the retrospective case-history type study and forward studies on cohorts for whom special data are available or can be collected in advance of the observation period. Both approaches could be used in studies to illuminate issues raised by these urban-rural comparisons.

Age and Sex Differences in Cancer Incidence

The age and sex patterns of cancer incidence in Iowa conformed generally to those reported from morbidity surveys elsewhere (*46*). The incidence of cancer increased rapidly during late adult life for both sexes (fig. 5); the rate for persons 75 years and over was more than 150 times that for persons under 15. Although incidence of cancer among females for all ages combined exceeded the incidence for males, this did not hold true for the entire life span. Higher rates prevailed among females from 10 to 60 years of age; at ages under 10 and over 65 the rates for males were higher. These relationships resulted from the relatively large number of malignancies of the breast and genital organs among females. Cancers of these sites develop at younger ages among women than do the predominant forms of cancer among men. For most sites other than reproductive organs, the incidence rates for males generally exceeded those for females throughout the life span (fig. 6). The site groups with the largest sex differentials—buccal cavity, respiratory system, urinary organs, skin—had sex-specific incidence

Figure 5. Cancer incidence rates per 100,000 population, by sex and age.



rates which tended to diverge with advancing age. These increasing sex differences constitute one of the persuasive arguments supporting hypotheses concerning environmental carcinogens.

The incidence of cancer of the male genital organs followed an entirely different course than the incidence of cancer of the female genital organs. The cancer rate for males, of which prostate was the principal component, rose sharply after age 60 and reached its peak in the oldest age group. If an exogenous agent were involved, the age pattern of cancer incidence would imply very long latent periods for the development of prostatic tumors. However, the observed age curve might reasonably be expected to result from endogenous factors. The latter possibility is compatible with the observed lack of an urban-rural difference for this site. Contrariwise, the incidence rate for genital cancers among females advanced steadily between 20 and 60 years of age and leveled off thereafter. This observation held for both cervical and endometrial cancers, despite other different epidemiological patterns of variation for these sites. Despite negative findings on the association of childbearing and cervical cancer (*47*), the rapid increase in incidence of cancer of the cervix from puberty to menopause, followed by a leveling-off and decline, still suggests the possible influence of events associated in some manner with the reproductive period.

The leveling off, or drop, in incidence of cancer of the respiratory system among males, in which lung and bronchus is the major component, after age 60 has been noted in other morbidity and mortality data. This seeming nonconformance to the pattern of continuously rising rates to the end of the life span for most site groups has been reconciled by several investigators, who selected cohorts (persons born about the same time) and traced the lung cancer rates for the same group of people at succeeding age and time intervals (*24*, *48*, *49*). When viewed in cohort fashion, the age-specific rates did yield orderly progressions of successively higher figures. Furthermore, the age-specific rates for each cohort were higher than the rates for all preceding cohorts. These results have led some persons to postulate the introduction of a carcinogenic agent around 1900, resulting in an age shift in lung cancer mortality as the portion of the life span spent in the years following 1900 increased (*48*). In Iowa, the leveling off of rates after age 60 for total respiratory system (and for lung and bronchus) was prominent for urban males; no certain conclusion can be reached on this point for rural males.

Urban-Rural Age Comparisons

For all sites combined, the relationship of urban and rural incidence rates at successive ages followed much the same pattern for each sex (fig. 7). Examination of the age-specific rates by site and sex reveals that urban-rural relationships noted in the age-adjusted rates (table 6) persisted over wide age spans. There is nothing in the age-specific data which would appear to contradict or to modify impressions drawn from the summary of adjusted rates. Rather, the consistency of the rate patterns would lend support to such inferences. None of the results in figures 8 and 9 seem inconsistent with the idea that possible environmental

factors are weak carcinogens with latent periods of 15 years or more between initial exposure and development of disease. Among males, the closest correspondence between the age-specific rates for urban and rural areas was observed for the digestive system and genital organs. Among females, urban-rural agreement was best for the digestive system. For males,

Figure 6. Cancer incidence rates per 100,000 population, major site groups, by sex and age.

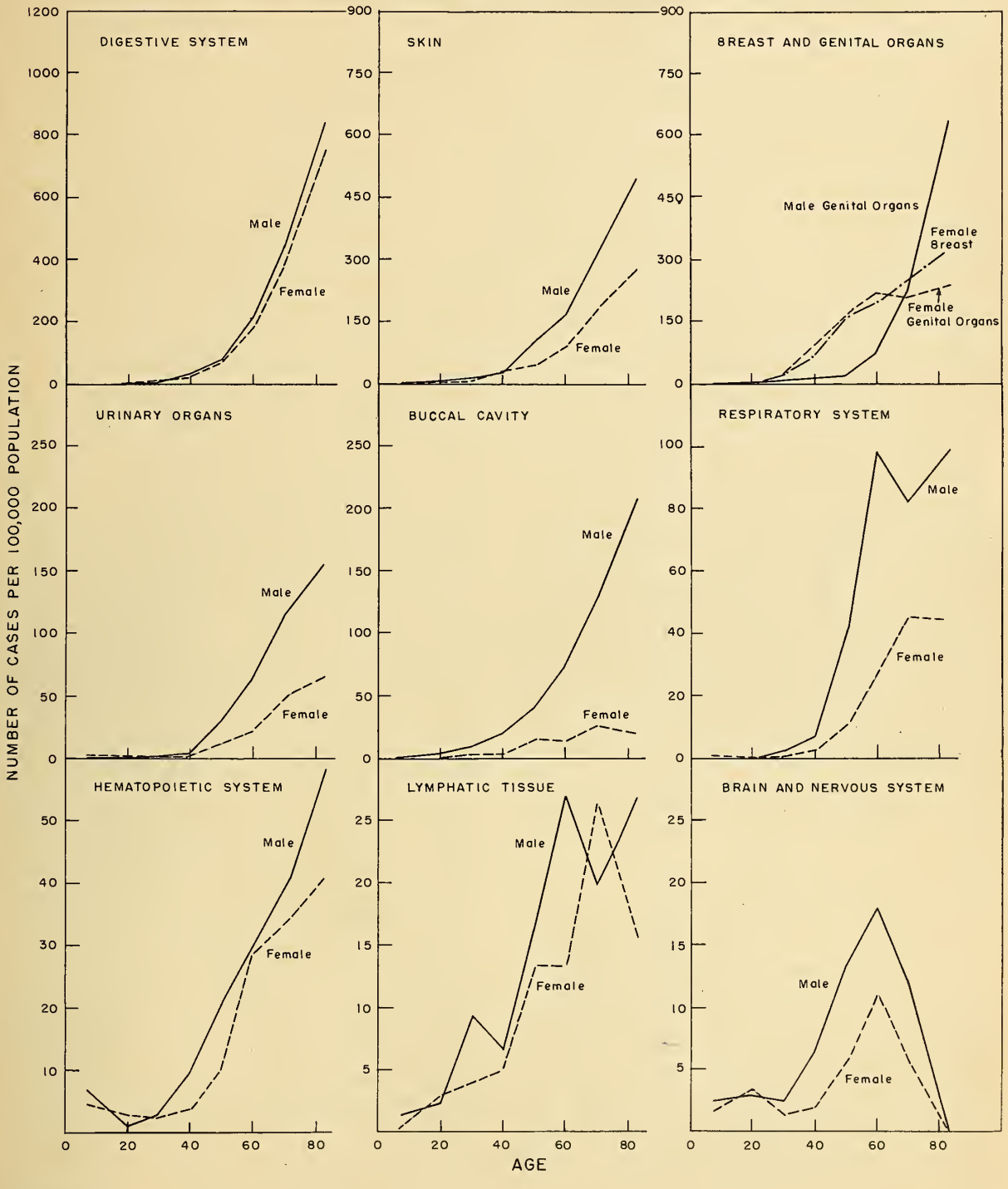
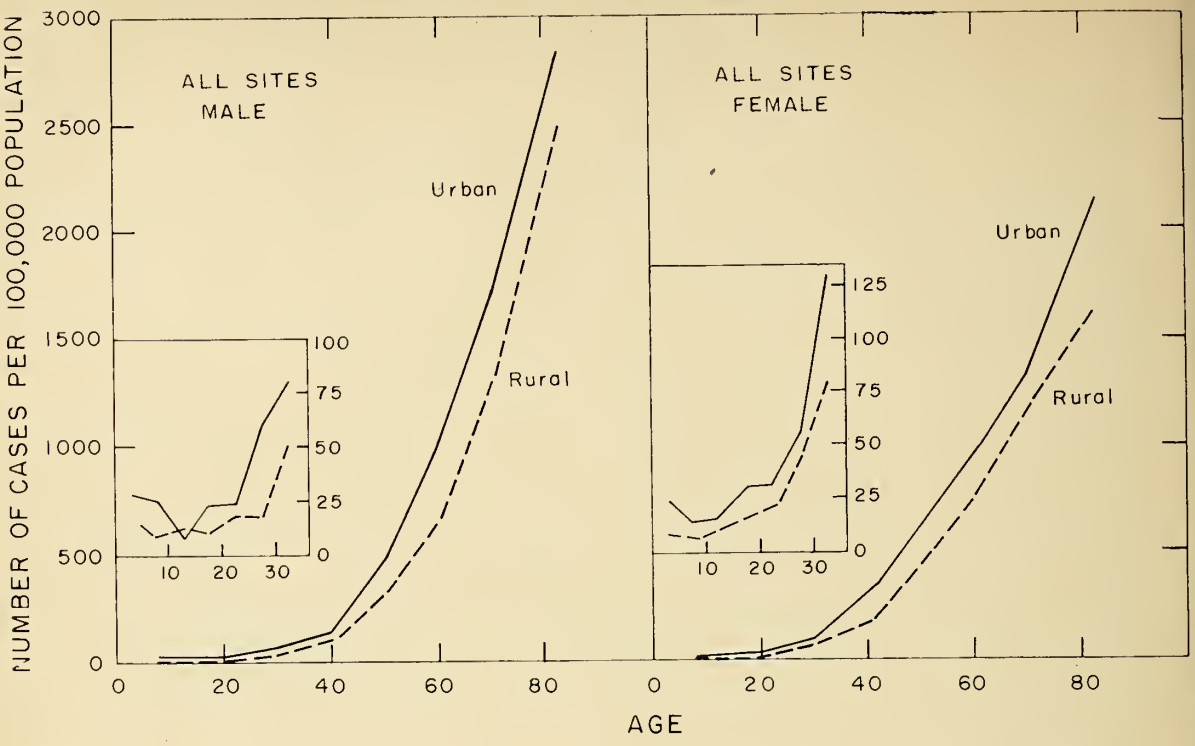


Figure 7. Cancer incidence rates per 100,000 population, urban and rural areas, for each sex, by age.



marked divergence in the rates appeared for the respiratory system and more moderate differences for buccal cavity, urinary organs, and skin. The most noticeable differences for females were found for genital organs, breast, and skin. For the respiratory system particularly, but also for buccal cavity and urinary organs, the disparity grew with advancing age among males; this relationship was present also for female genital organs.

The age-specific rates on which figures 8 and 9 are based will be found in appendix table 2.

Microscopically Confirmed Cases

The basic urban-rural age relationships observed for incidence of all newly diagnosed cases of cancer were essentially repeated when comparisons were restricted to microscopically confirmed cases only, as can be seen by comparing the rates for microscopically confirmed cases by primary site in appendix table 3 with the corresponding figures for total newly diagnosed cases in appendix table 1. The effect of this restriction to microscopically confirmed cases only is illustrated in figure 10 for lung and bronchus (males), large intestine (females), and cervix. The proportion of microscopically confirmed cases becomes lower at older ages, particularly among rural residents, and this restriction appears to exaggerate urban-rural differences at ages over 75.

Comparisons With Danish Data

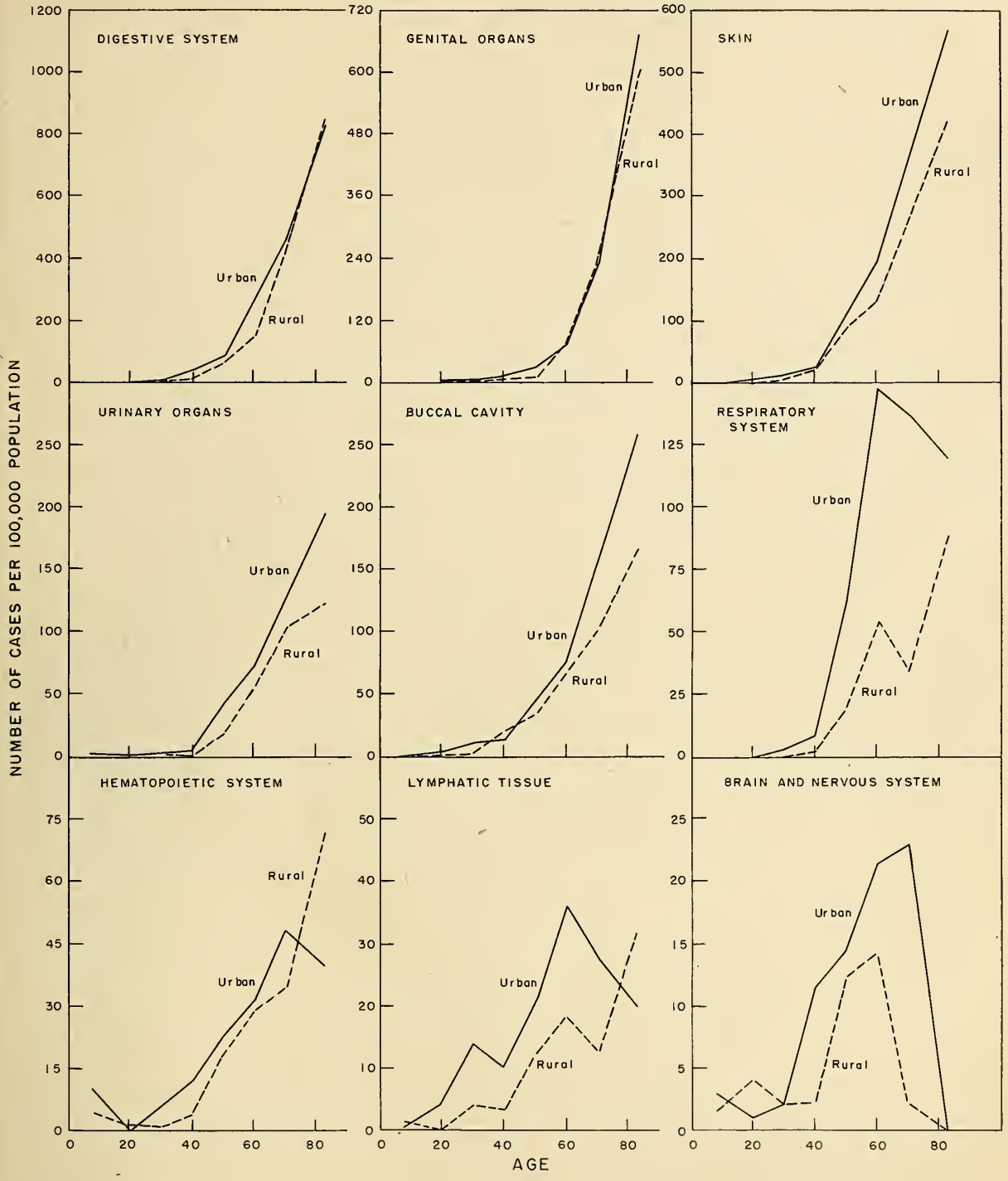
The only other extensive data on age-specific cancer incidence among urban and rural residents have been published by Clemmesen and Nielsen (*25*) for Denmark. Other agencies collecting morbidity data from both urban and rural areas will undoubtedly report their findings at future dates. At this time, it is interesting to compare the sex and age-specific rates for selected sites for Denmark and Iowa, if for no other purpose than to demonstrate that the Iowa results are not unique.

The Danish material excluded sarcomas, a practice not followed in collecting data in Iowa. For the sites in figure 11, the proportion of

sarcomas in the Iowa data was small, and this qualification constitutes no serious impediment to the drawing of comparisons.

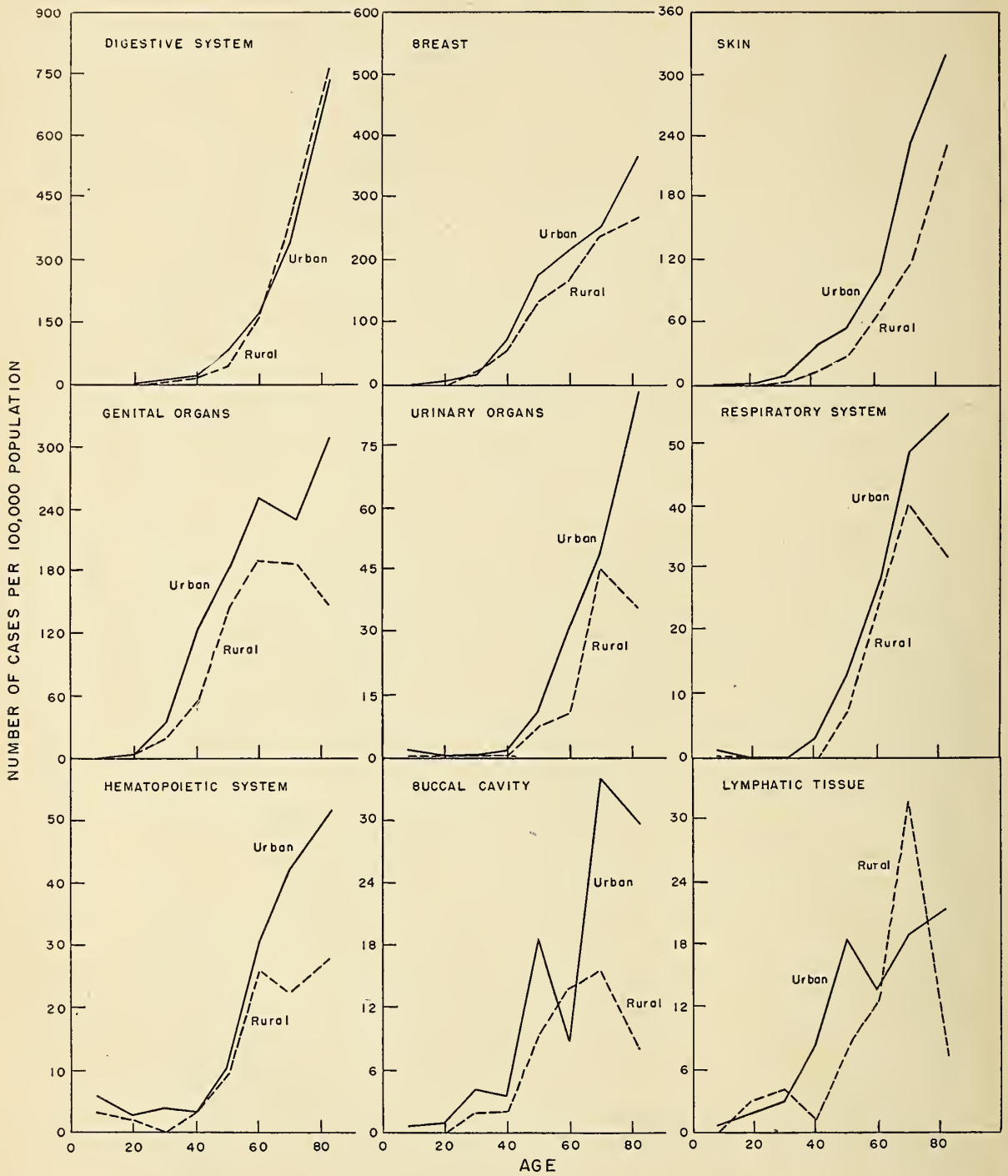
The Danish population was grouped into three categories—Copenhagen metropolitan area (capital), provincial towns, and rural. Copenhagen and the provincial towns combined may be taken as a rough equivalent to

Figure 8. Cancer incidence rates per 100,000 population for selected site groups, for males in urban and rural areas, by age.



urban Iowa. In general, the Danish data exhibited an orderly progression in incidence rates by population size, the rates for provincial towns usually lying between those for Copenhagen and rural areas. For this reason, the rates for provincial towns have not been included routinely in figure 11. Because of differences in population composition, way of

Figure 9. Cancer incidence rates per 100,000 population for selected site groups, for females in urban and rural areas, by age.



life, and possible exposure to carcinogenic hazards, as well as in methods for collecting data, close agreement in magnitude between rates in the two studies could not be expected. Attention should be directed principally to the urban-rural relationships.

The Danish and Iowa experiences corresponded in indicating a substantial urban-rural differential in incidence for all sites combined (exclusive of skin, lymphatic tissue, and hematopoietic system). For lung and bronchus, both sets of data exhibited a less pronounced urban-rural differential among females.

There was confirmation of two distinct urban-rural patterns for cervix and corpus uteri. Although the Iowa and Danish age-specific corpus rates did not correspond too well, it seems evident that the urban-rural difference for endometrial cancer was much smaller than that observed for cervix. The lower Danish rates at the older ages may have resulted from poorer reporting since an abnormally high proportion of cases in that series were reported by death certificates. Although the size of the urban-rural breast cancer differences were not as great as for some other sites, the consistent relationship in the two areas supports the impression of a true difference in risk. This suggests that any factors associated with urbanization, accounting for higher breast cancer rates, need not be peculiar to the United States.

Neither the Danish nor the Iowa data support the impression of considerably higher skin cancer incidence rates among rural populations gained from reading some medical textbooks. Among Danish males the skin cancer rates in provincial towns were about as high as in rural areas. Up to age 75, the combined rates for Copenhagen and the provincial towns did not differ markedly from the rates for rural Denmark among either males or females. The sizable urban excess in skin cancer incidence in Iowa has been noted previously. Carcinogenic effects of certain portions of the sunlight spectrum have been demonstrated by animal experimentation (*50*) and clearly supported by epidemiological observation. In the cancer morbidity surveys of 10 cities (*1–10*), southern cities, where exposure to sunlight is more intense, had higher skin cancer rates. The effect of exposure to sunlight is also apparent in the comparison of these rates for Denmark and Iowa. However, it does not necessarily follow that, at the same latitudes, the rural population has had more exposure of the skin to sunlight than the urban dwellers. Also, the potential role of greater urban exposure to other skin cancer agents, particularly in occupational pursuits, needs to be considered.

Relative Frequency Distributions

Although cancers tend to appear in late adult life, some forms occur relatively frequently among young people. The five leading sites for men and women of all ages and in nine age bands are listed in table 10. Another facet of the age pattern of cancer illness is illustrated in table 11, which shows the percentage distribution by age for major site groups. Although less than 5 percent of all resident cases diagnosed during the study year occurred among

Figure 10. Comparison of incidence of cancer of large intestine and cervix in females and of cancer of lung and bronchus in males, all cases and microscopically confirmed cases only, by age.

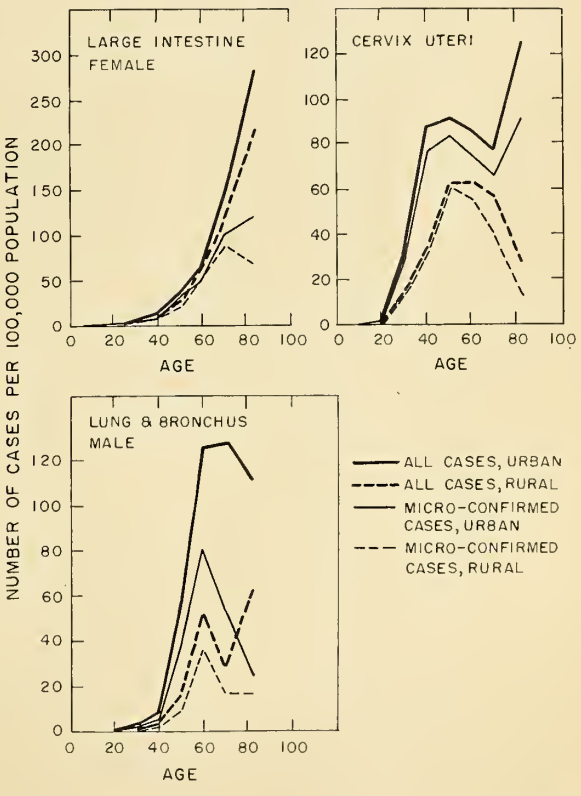
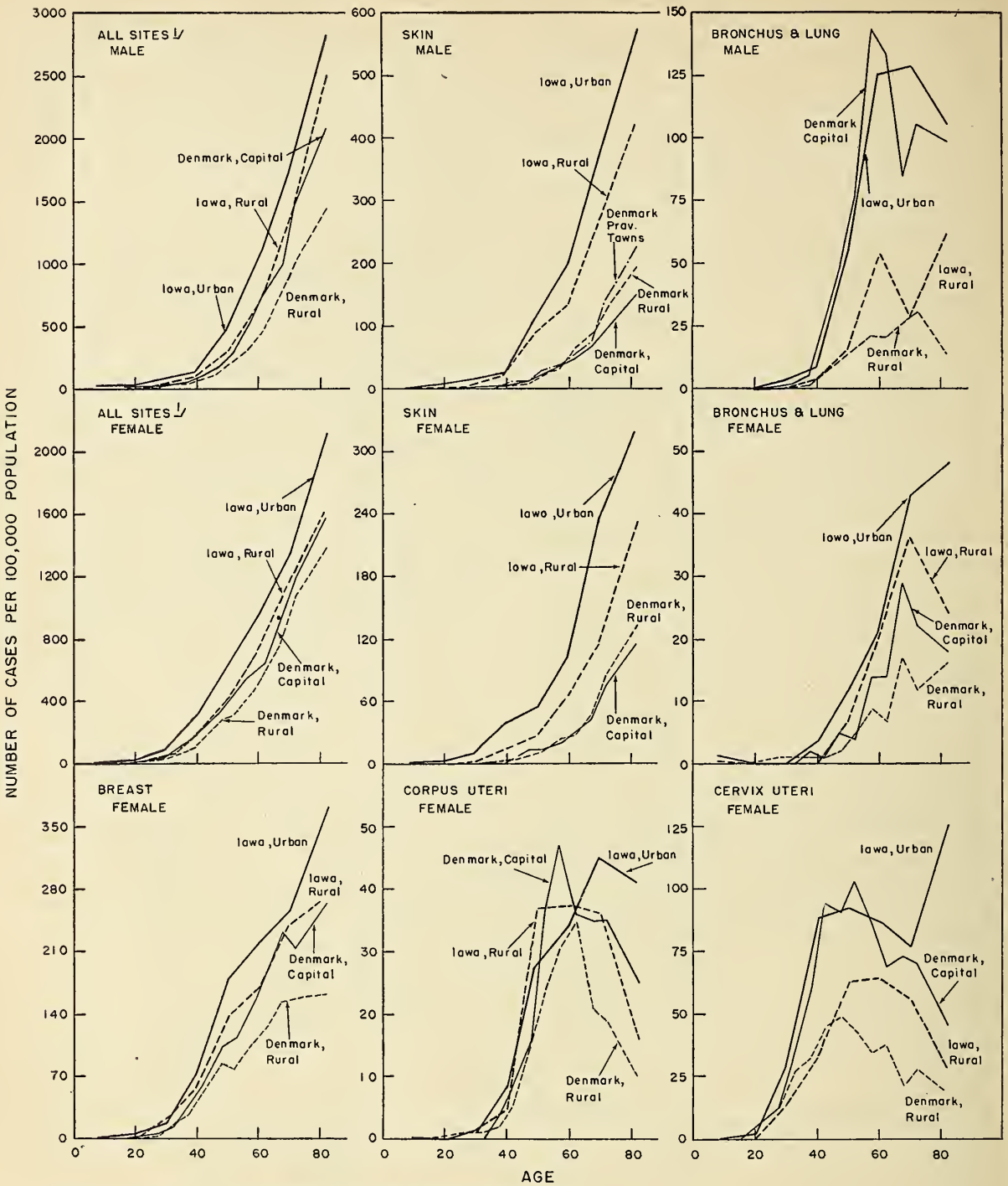


Figure 11. Comparison of cancer incidence per 100,000 population in urban and rural populations in Iowa and Denmark, selected site groups, by age and sex.



[1] Excludes skin, lymphatic tissue, and hematopoietic system.

Table 10. Five leading cancer sites in each age group, by sex: newly diagnosed resident cancer cases

Age group	Both sexes		Male		Female	
	Percent [1]	Primary site	Percent [1]	Primary site	Percent [1]	Primary site
All ages	25. 1	Digestive system.	26. 8	Digestive system.	23. 7	Digestive system.
	18. 8	Genital organs.	20. 5	Skin.	22. 8	Genital organs.
	16. 1	Skin.	14. 5	Genital organs.	22. 2	Breast.
	11. 5	Breast.	9. 2	Buccal cavity.	11. 9	Skin.
	5. 4	Buccal cavity.	7. 1	Respiratory system.	2. 9	Hematopoietic system.
Under 15	40. 4	Hematopoietic system.	43. 3	Hematopoietic system.	36. 3	Hematopoietic system.
	12. 5	Brain and nervous system.	13. 3	Brain and nervous system.	13. 6	Urinary organs.
	10. 7	Urinary organs.	8. 3	Urinary organs.	11. 4	Brain and nervous system.
	4. 8	Lymphatic tissue.	6. 7	Lymphatic tissue.	6. 8	Genital organs.
	4. 8	Soft tissue.	5. 0	Soft tissue.	6. 8	Skin.
15–24	16. 1	Genital organs.	20. 6	Skin.	19. 2	Genital organs.
	13. 6	Brain and nervous system.	17. 6	Buccal cavity.	12. 8	Brain and nervous system.
	13. 6	Skin.	14. 7	Brain and nervous system.	12. 8	Breast.
	11. 2	Lymphatic tissue.	11. 8	Lymphatic tissue.	10. 6	Lymphatic tissue.
	8. 6	Hematopoietic system.	11. 8	Genital organs.	10. 6	Hematopoietic system.
25–34	26. 7	Genital organs.	18. 6	Skin.	36. 0	Genital organs.
	13. 7	Breast.	17. 5	Lymphatic tissue.	22. 9	Breast.
	13. 3	Skin.	15. 5	Buccal cavity.	9. 7	Skin.
	10. 0	Lymphatic tissue.	12. 3	Genital organs.	9. 0	Digestive system.
	9. 1	Digestive system.	9. 3	Digestive system.	5. 6	Endocrine glands.
35–44	28. 8	Genital organs.	22. 0	Digestive system.	38. 7	Genital organs.
	19. 4	Breast.	20. 4	Skin.	28. 7	Breast.
	14. 8	Skin.	15. 8	Buccal cavity.	12. 0	Skin.
	13. 1	Digestive system.	9. 2	Genital organs.	8. 7	Digestive system.
	6. 1	Buccal cavity.	8. 2	Hematopoietic system.	2. 0	Lymphatic tissue.
45–54	20. 2	Genital organs.	26. 9	Skin.	31. 2	Genital organs.
	17. 8	Breast.	18. 9	Digestive system.	30. 0	Breast.
	15. 9	Skin.	10. 5	Respiratory system.	12. 3	Digestive system.
	15. 0	Digestive system.	10. 4	Buccal cavity.	8. 2	Skin.
	5. 9	Buccal cavity.	7. 7	Urinary organs.	2. 7	Buccal cavity.
55–64	22. 9	Digestive system.	25. 8	Digestive system.	26. 1	Genital organs.
	17. 8	Genital organs.	20. 3	Skin.	22. 8	Breast.
	15. 1	Skin.	12. 2	Respiratory system.	20. 0	Digestive system.
	11. 9	Breast.	9. 1	Genital organs.	10. 2	Skin.
	7. 5	Respiratory system.	9. 0	Buccal cavity.	3. 4	Hematopoietic system.
65–74	29. 9	Digestive system.	29. 9	Digestive system.	29. 8	Digestive system.
	17. 7	Skin.	21. 0	Skin.	19. 8	Breast.
	16. 3	Genital organs.	16. 1	Genital organs.	16. 5	Genital organs.
	9. 7	Breast.	8. 6	Buccal cavity.	14. 1	Skin.
	5. 9	Urinary organs.	7. 8	Urinary organs.	3. 8	Urinary organs.
75–84	35. 6	Digestive system.	32. 4	Digestive system.	39. 4	Digestive system.
	19. 3	Genital organs.	24. 5	Genital organs.	17. 6	Breast.
	16. 0	Skin.	17. 8	Skin.	13. 7	Skin.
	7. 9	Breast.	7. 9	Buccal cavity.	12. 8	Genital organs.
	4. 8	Buccal cavity.	5. 6	Urinary organs.	3. 6	Urinary organs.
85 and over	33. 7	Digestive system.	29. 0	Digestive system.	38. 9	Digestive system.
	20. 0	Skin.	21. 8	Genital organs.	18. 5	Skin.
	16. 4	Genital organs.	21. 3	Skin.	14. 4	Breast.
	6. 7	Breast.	8. 0	Buccal cavity.	10. 3	Genital organs.
	5. 0	Urinary organs.	7. 1	Urinary organs.	2. 6	Urinary organs.

[1] Percentage of all cancers in the age and sex group indicated. Since an abridged listing of only 5 sites is presented, the figures do not add to 100 percent. Numbers of cases are given in appendix table 4.

Table 11. Percentage distribution of newly diagnosed resident cancer cases, by primary site and age

Primary site	Number of cases	Age (years)							
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over
All sites	9, 088	1. 1	0. 9	2. 7	6. 5	14. 8	23. 6	26. 5	19. 3	4. 6
Male	4, 449	1. 3	. 8	2. 2	4. 4	12. 6	23. 5	28. 4	21. 7	5. 1
Female	4, 639	. 9	1. 0	3. 1	8. 5	17. 0	23. 7	24. 6	17. 0	4. 2
Urban	5, 064	1. 2	1. 0	3. 0	7. 1	15. 4	24. 1	25. 5	18. 7	4. 0
Rural	4, 024	1. 1	. 7	2. 3	5. 6	14. 2	22. 9	27. 6	20. 1	5. 5
Buccal cavity and pharynx	490	. 4	1. 4	4. 3	7. 3	16. 1	22. 3	27. 0	17. 3	3. 9
Digestive system	2, 284	. 1	. 3	1. 0	3. 4	8. 9	21. 5	31. 3	27. 3	6. 2
Respiratory system	437	. 9	0	. 7	3. 4	17. 2	37. 1	25. 4	13. 0	2. 3
Breast	1, 047	0	. 6	3. 2	10. 9	22. 8	24. 3	22. 2	13. 3	2. 7
Female genital organs	1, 058	. 3	. 9	4. 9	14. 4	23. 3	27. 0	17. 8	9. 5	1. 9
Male genital organs	647	0	. 6	1. 9	2. 8	4. 3	14. 7	31. 5	36. 6	7. 6
Urinary organs	439	2. 6	. 7	1. 4	1. 8	13. 2	24. 8	32. 0	18. 7	4. 8
Skin	1, 463	. 3	. 8	2. 2	5. 9	14. 7	22. 1	29. 2	19. 1	5. 7
Brain and nervous system	124	10. 5	8. 9	4. 8	11. 3	22. 6	29. 8	12. 1	0	0
Endocrine glands [1]	66	3. 0	6. 1	15. 2	3. 0	18. 2	30. 2	16. 7	6. 1	1. 5
Bone	58	6. 9	3. 4	8. 6	13. 9	8. 6	12. 1	22. 4	22. 4	1. 7
Soft tissue	55	9. 1	1. 8	5. 5	14. 5	23. 7	21. 8	10. 9	9. 1	3. 6
Lymphatic tissue	214	2. 3	4. 2	11. 2	8. 9	20. 6	24. 3	19. 2	7. 9	1. 4
Hematopoietic system	315	13. 3	2. 2	3. 2	7. 0	14. 6	24. 2	20. 6	13. 0	1. 9
Other and ill-defined sites	391	1. 5	. 3	. 5	2. 0	14. 6	28. 6	25. 6	17. 9	9. 0

[1] Not elsewhere classified.

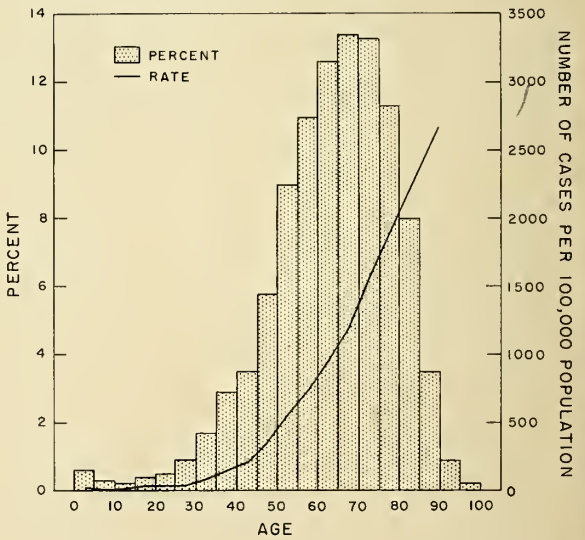
persons under 35 years of age, a substantial proportion of cancers of the following sites were found in this age group:

Site	*Percent*
Brain and nervous system	24
Endocrine glands	24
Bone	20
Hematopoietic system	19
Lymphatic tissue	18
Soft tissue	16

The distinction between information provided by a percentage distribution of newly diagnosed cases and by age-specific incidence rates merits emphasis. Since incidence measures the risk of developing cancer during a specified time period for persons of a given age, it may also be viewed as an index of the expected case-finding rate for the population in question. The age distribution of cases cannot be employed to estimate risk or to estimate a case-finding rate without further knowledge of the population at risk in various age groups. Figure 12 illustrates the information provided by these two approaches.

Both presentations are useful. For example, large-scale cancer case-finding programs may need to compromise three conflicting goals: to find the largest possible number of cases; to find cases among young persons in order to

Figure 12. Percentage distribution and incidence rate per 100,000 population, newly diagnosed cancer cases, by age.



salvage the maximum number of years of productive life; and to provide a high yield of positives among the population screened in order to minimize case-finding costs. From the survey data, the following inferences seem clear. A successful diagnostic test (if and when available) performed on persons over 70 years of age would produce a high proportion of positives. However, it would not yield many cases since the number of older people to be tested is small. Screening persons under 50 years of age would be expensive in terms of positive cases per total cost of screening and would not detect the majority of the cases. Work on persons 50 to 70 years of age would appear to be productive since incidence here is sizable and roughly half of all newly diagnosed cancer cases would be found in this age bracket.

Histological Type

Although primary site is the single most important classification of cancer cases, data on histological type may contribute additional information useful for epidemiological studies. No general agreement has yet been reached on standard nomenclature and practice for reporting histological type; this hampers the classification of material collected in field studies. All histological diagnoses obtained in the Iowa survey were coded in accordance with the classification in the Manual of Tumor Nomenclature and Coding (*51*).

Of necessity, the material in this chapter has been restricted to cases with histologically confirmed diagnoses. Of such newly diagnosed cases in Iowa for 1950, 86 percent were carcinomas, a figure in close agreement with that for the 10-city morbidity survey (*46*). Within Iowa, there was no difference in this respect between urban and rural residents. Of every 100 newly diagnosed cases, adenocarcinomas accounted for roughly 40; 30 were epidermoid carcinomas; and another 15 were unspecified neoplasms of epithelial origin.

Table 12. Percentage distribution of newly diagnosed resident cancer cases, by histological type, according to sex, for urban and rural residents

Histological type and list number [1]	Sex and residence					
	Male			Female		
	Total	Urban	Rural	Total	Urban	Rural
All types: Number	2, 854	1, 600	1, 254	3, 337	1, 968	1, 369
Adenocarcinoma (00–09)	29. 8	29. 2	31. 0	49. 8	46. 6	54. 1
Transitional cell carcinoma (11)	5. 7	5. 9	5. 4	1. 2	1. 4	1. 0
Basal and baso-squamous cell carcinoma (12, 13)	10. 4	11. 4	9. 0	6. 1	7. 2	4. 5
Squamous cell carcinoma (14)	22. 0	21. 1	23. 2	16. 3	17. 8	13. 9
Melanoma (17)	1. 1	1. 1	1. 0	1. 3	1. 3	1. 2
Unspecified epithelial carcinoma (18, 19)	14. 7	15. 5	13. 7	13. 3	13. 7	12. 7
Leukemia (20–29)	3. 9	3. 4	4. 5	2. 2	2. 4	2. 0
Lymphoma (30–39)	4. 3	4. 7	3. 7	2. 8	2. 6	3. 0
Neural tissue tumor (40–49)	1. 7	2. 0	1. 3	1. 1	1. 3	. 8
Other sarcoma (50–79)	2. 1	1. 9	2. 3	2. 0	2. 0	2. 5
Embryonal and mixed tissue tumor (80–89)	1. 9	2. 0	1. 7	1. 0	1. 4	. 6
Unspecified type (98, 99)	2. 4	1. 8	3. 2	2. 9	2. 3	3. 7

[1] Manual of Tumor Nomenclature and Coding (*51*).

There was a sex difference in the distribution of carcinomas. Adenocarcinoma (Nos. 00–09) was the type specified for 49 percent of tumors in females as opposed to 30 percent of tumors in males. Epidermoid carcinoma (Nos. 11–14) was the leading type among males (38 percent) but ranked second (24 percent) to adenocarcinoma among females. One site, breast, accounts for much of the preponderance of adenocarcinoma among females. Appendix table 7 distributes the tumors by detailed histological type and sex.

No marked urban-rural differences in histological type were revealed for either sex, as shown in table 12.

Primary Site

Appendix table 8 summarizes the distribution of newly diagnosed resident cancer cases by histological type for specific primary sites. Special subtabulations are carried for those site groups in which types other than carcinoma predominate. In one sense, this table re-

Table 13. Percentage distribution of newly diagnosed cancer cases,[1] by histological type, age, and sex, 1950 (Microscopically confirmed cases only)

Histological type and list number[2]	Age (years)									
	All ages	0–4	5–14	15–24	25–34	35–44	45–54	55–64	65–74	75 and over
	Male									
All types: Number	3,025	27	25	28	82	169	437	804	863	590
Adenocarcinoma (00–09)	30.2	3.7	4.0	7.1	18.3	24.3	22.7	30.8	34.8	35.2
Transitional cell carcinoma (11)	5.8	0	0	3.6	1.2	1.8	5.3	6.0	7.0	6.4
Basal and baso-squamous cell carcinoma (12, 13)	10.3	3.7	0	3.6	7.3	13.0	11.7	10.4	9.7	10.7
Squamous cell carcinoma (14)	21.6	0	4.0	17.9	9.8	20.7	24.9	23.6	22.6	18.5
Melanoma (17)	1.2	0	4.0	7.1	3.7	.6	2.3	.9	1.0	.3
Unspecified epithelial carcinoma (18, 19)	14.8	0	0	10.7	4.9	8.3	15.1	14.1	15.1	20.2
Leukemia (20–29)	3.9	40.8	36.0	3.6	6.1	6.5	3.9	3.0	2.9	2.7
Lymphoma (30–39)	4.2	7.4	12.0	10.7	14.6	5.9	5.0	5.5	2.3	1.7
Neural tissue tumor (40–49)	1.7	18.5	12.0	7.1	3.7	5.3	2.3	1.1	1.0	0
Other sarcoma (50–79)	2.1	11.1	20.0	7.1	8.5	4.7	2.3	1.5	1.2	1.2
Embryonal and mixed tissue tumor (80–89)	1.9	11.1	8.0	17.9	19.5	7.7	1.8	.7	.1	.7
Unspecified type (98, 99)	2.3	3.7	0	3.6	2.4	1.2	2.7	2.4	2.3	2.4
	Female									
All types: Number	3,537	23	18	42	141	390	727	903	829	464
Adenocarcinoma (00–09)	49.4	4.3	5.6	16.6	37.0	45.0	53.9	54.9	51.0	43.1
Transitional cell carcinoma (11)	1.2	0	0	2.4	0	.3	.4	1.1	1.9	2.8
Basal and baso-squamous cell carcinoma (12, 13)	6.0	4.3	0	0	2.8	6.4	4.1	5.6	7.4	8.6
Squamous cell carcinoma (14)	16.5	0	5.6	4.8	25.5	24.6	16.4	14.3	14.2	17.2
Melanoma (17)	1.2	0	5.6	0	2.8	1.5	1.5	1.0	1.0	1.1
Unspecified epithelial carcinoma (18, 19)	13.5	0	0	14.3	11.3	9.2	13.9	13.7	14.8	15.5
Leukemia (20–29)	2.2	47.9	27.7	9.5	2.8	1.0	1.5	1.8	1.8	1.7
Lymphoma (30–39)	2.8	0	11.1	11.9	5.0	2.8	2.9	2.1	3.0	2.2
Neural tissue tumor (40–49)	1.2	8.7	27.7	14.3	2.1	.5	.7	1.3	.7	.2
Other sarcoma (50–79)	2.1	13.0	5.6	4.8	1.4	4.6	2.1	1.2	1.2	2.6
Embryonal and mixed tissue tumor (80–89)	1.0	21.8	11.1	14.3	5.0	1.0	.3	.3	.2	1.1
Unspecified type (98, 99)	2.9	0	0	7.1	4.3	3.1	2.3	2.7	2.8	3.9

[1] Includes nonresident cases.
[2] Manual of Tumor Nomenclature and Coding *(51)*.

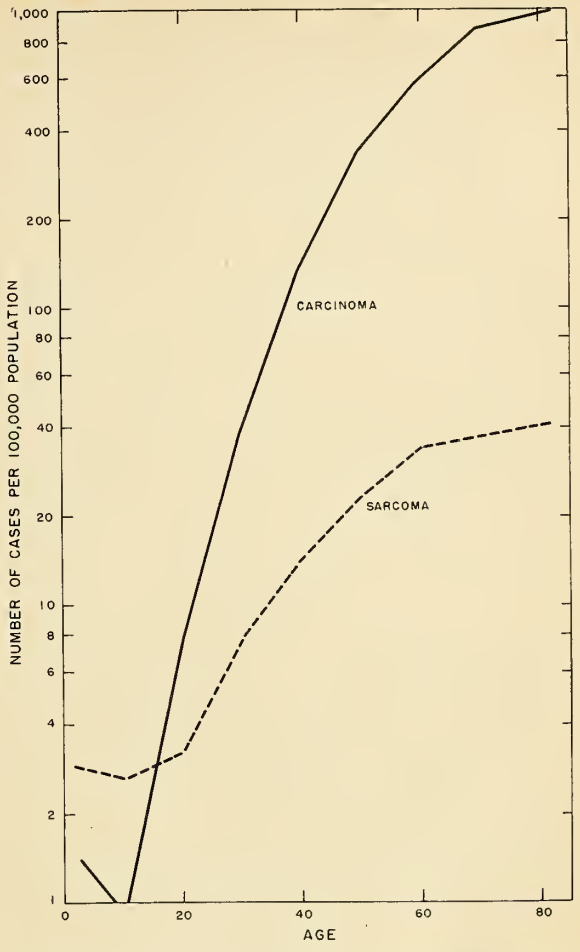
emphasizes the primary importance of classification by primary site, since it reveals clearly the preponderance of a single histological type within a single site. Only a few sites, such as esophagus, bronchus and lung, and cervix, reveal any sizable proportions or numbers of both glandular and epidermoid carcinomas. The small numbers of secondary histological types within any specific site prevent detailed discussion of site-histological type relationships.

The results of urban-rural comparisons made by primary site for all newly diagnosed cases, which remained essentially unaltered when comparisons were drawn for microscopically proved cases only, are also reproduced when comparison is further narrowed to the predominant histological type for each of these sites.

Age Distribution

Percentage distributions of cancer cases by histological type, with respect to age and sex, are presented in table 13. Leukemia was the leading type at ages under 15. Thereafter, carcinomas became the numerically most important type, their predominance becoming more pronounced at each succeeding age up to the end of the life span. In this presentation of relative frequencies, the lessening relative importance of lymphomas and other sarcomas at older ages should not mislead one into thinking that the risk of developing sarcoma declines with advancing age. When the number of sarcomas is related to the population base to compute estimates of "incidence" (understated because these data relate to microscopically confirmed cases only), its incidence is shown clearly to rise with age. The data for sarcoma and carcinoma are plotted on a semilogarithmic scale (fig. 13). However, the relative rate of increase with age (indicated by the slope of the curves) is smaller for sarcomas than for carcinomas. These findings are essentially similar to those reported for the 10-city surveys (*46*).

Figure 13. Comparison of incidence of microscopically confirmed cases of carcinoma and sarcoma, by age.



Stage at Diagnosis

Information on stage of disease at time of diagnosis was secured equally well for the urban and rural cases reported by hospitals and physicians. For the State as a whole, sufficient detail was supplied to enable classification in this respect of 78 percent of the newly diagnosed cases, which compared favorably with the surveys conducted by the National Cancer Institute for 10 urban areas (*1–10*). Because of the inherent difficulties in determining the stage of cancer, this was the survey item most subject to error. It required close reading of case records for evidence of regional involvement or metastasis as of the time of first diag-

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nosis, which in some instances might be overlooked or not appear in the record. Under these circumstances, some overstatement of the frequency of localized cases is to be expected. Despite this difficulty, classification by stage still provides meaningful data for some comparative purposes; witness, for example, the differences in survival rates by stage.

For the newly diagnosed cases of known stage, excluding cancers of the hematopoietic system and lymphatic tissue, the malignant growth was confined to the original anatomic site in 67 percent, had spread to adjacent tissues or regional lymph nodes in 24 percent, and had metastasized to remote tissues in 9 percent (table 14). The proportion reported in Iowa as localized exceeded by a wide margin the average for all whites in the 1947–48 surveys:

Table 14. Percentage distribution, by stage at diagnosis, of resident cancer cases diagnosed during the study year, by primary site and sex

Primary site and sex	Number of cases of known stage [1]	Percentage distribution by stage		
		Localized	Regional involvement	Remote metastasis
All sites	6,396	63.7	23.7	12.6
All sites, excluding lymphatic tissue and hematopoietic system	6,034	66.8	24.4	8.8
Male	2,895	70.8	20.1	9.1
Female	3,139	63.0	28.5	8.5
All sites, excluding lymphatic tissue, hematopoietic system, and skin	4,847	59.6	29.6	10.8
Male	2,139	61.6	26.2	12.2
Female	2,708	58.1	32.2	9.7
Buccal cavity and pharynx	345	85.8	12.8	1.4
Male	300	85.3	13.0	1.7
Female	45	88.9	11.1	0
Lip	188	96.8	2.7	.5
Digestive system	1,474	48.6	39.1	12.3
Male	744	48.3	38.4	13.3
Female	700	49.0	39.9	11.1
Stomach	357	38.4	47.0	14.6
Large intestine	481	51.3	38.9	9.8
Rectum	289	66.4	26.0	7.6
Pancreas	127	37.8	39.4	22.8
Respiratory system	280	52.5	27.9	19.6
Male	214	50.9	27.6	21.5
Female	66	57.6	28.8	13.6
Lung and bronchus	249	48.2	29.7	22.1
Breast	810	51.4	40.1	8.5
Female genital organs	813	71.5	21.2	7.3
Uterus	605	77.3	17.2	5.5
Cervix	364	73.9	20.6	5.5
Corpus	133	93.2	4.5	2.3
Unspecified	108	69.4	21.3	9.3
Ovary	154	47.4	37.0	15.6
Male genital organs	417	68.1	20.1	11.8
Prostate	364	65.9	21.2	12.9
Urinary organs	319	76.8	15.0	8.2
Male	229	79.5	13.9	6.6
Female	90	70.0	17.8	12.2
Kidney	74	51.3	25.7	23.0
Bladder	239	84.5	11.7	3.8
Skin	1,187	95.9	3.5	.6
Male	756	96.9	2.6	.5
Female	431	94.4	4.9	.7
Brain and nervous system	66	80.3	18.2	1.5
Male	39	74.3	23.1	2.6
Female	27	88.9	11.1	0
Lymphatic tissue	107	32.7	38.3	29.0
Male	59	30.5	40.7	28.8
Female	48	35.4	35.4	29.2
Hematopoietic system	255	2.7	1.2	96.1
Male	144	2.1	1.4	96.5
Female	111	3.6	.9	95.5
Other and ill-defined sites	323	46.8	29.1	24.1

[1] Total numbers of cases, including stage unknown, are given in table 16.

only two urban areas, Birmingham and Denver, reported data comparable in this respect. The Iowa results also appeared more favorable, site by site, than those secured from the statewide cancer registry in Connecticut (*26*). However, in view of the great variation between study areas, certainly attributable in part to classification difficulties, they cannot be interpreted as clear-cut evidence of superiority in finding cases early.

Of particular interest, for the interpretation of morbidity rates, was the stability within the State of the data on stage of disease. Very close agreement was exhibited in the proportion of early cases among urban and rural residents (all sites, exclusive of lymphatic tissue and hematopoietic system: urban, 68 percent; rural, 66 percent), and was carried over to comparisons for major site groups (table 15). These similarities extended to regional distributions also. The range in extreme values for all sites combined ran from 58 percent localized in regions 3 and 7 to 68 percent in region 5. For several of the major site groups the differences among the seven regions were so small that they might well be attributed to sampling fluctuations. These observations provide further support to the impression of a rather uniform pattern of medical care throughout the State.

A somewhat higher proportion of cancers among males were diagnosed while localized (71 percent, excluding lymphatic tissue and hematopoietic system) than among females (63 percent). This resulted not from a systematic sex differential for certain sites, but from the preponderance of breast cancers among women, for which the probability of early diagnosis has been relatively poor. The consistently high proportion of breast cancer cases with evidence of extension from the primary site, encountered in all morbidity surveys, might be advanced by

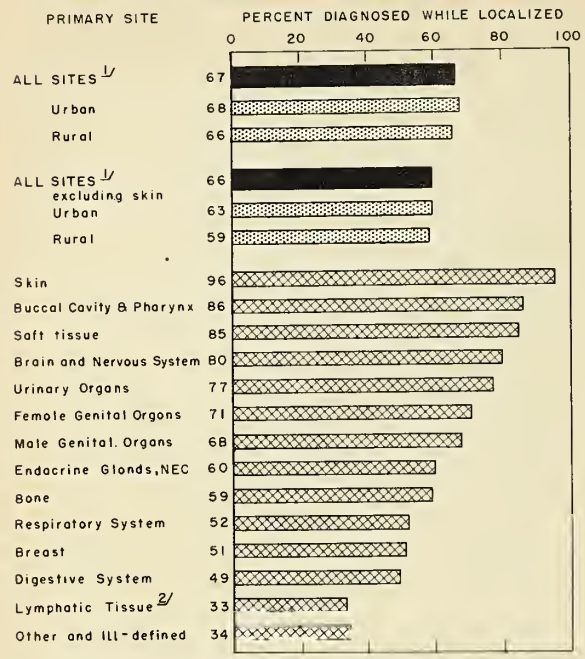
Table 15. Percentage distribution, by stage at diagnosis, of resident cancer cases diagnosed during the study year, by primary site, for urban and rural areas

Primary site	Number of cases of known stage [1]		Percentage distribution, by stage					
			Localized		Regional		Remote	
	Urban [2]	Rural	Urban [2]	Rural	Urban [2]	Rural	Urban [2]	Rural
All sites, excluding lymphatic tissue and hematopoietic system	3, 394	2, 640	67. 5	65. 9	23. 6	25. 5	8. 9	8. 6
Male	1, 569	1, 326	69. 8	72. 0	20. 3	19. 8	9. 9	8. 2
Female	1, 825	1, 314	65. 5	59. 6	26. 4	31. 4	8. 1	9. 0
All sites, excluding lymphatic tissue, hematopoietic system, and skin	2, 710	2, 137	60. 3	58. 8	28. 7	30. 7	11. 0	10. 5
Male	1, 166	973	60. 3	63. 2	26. 6	25. 8	13. 1	11. 0
Female	1, 544	1, 164	60. 2	55. 1	30. 3	34. 8	9. 5	10. 1
Buccal cavity and pharynx	187	158	85. 1	86. 7	12. 8	12. 7	2. 1	. 6
Digestive system	776	698	48. 8	48. 5	38. 4	39. 8	12. 8	11. 7
Respiratory system	185	95	53. 5	50. 5	27. 0	29. 5	19. 5	20. 0
Breast	448	362	52. 5	50. 0	39. 2	41. 2	8. 3	8. 8
Female genital organs	501	312	71. 5	71. 5	21. 3	21. 1	7. 2	7. 4
Male genital organs	204	213	69. 1	67. 2	20. 6	19. 7	10. 3	13. 1
Urinary organs	183	136	79. 2	73. 5	13. 1	17. 7	7. 7	8. 8
Skin	684	503	96. 0	95. 8	3. 4	3. 6	. 6	. 6
Brain and nervous system	39	27	84. 6	74. 1	15. 4	22. 2	0	3. 7
Lymphatic tissue	67	40	26. 9	42. 5	47. 7	22. 5	25. 4	35. 0
Hematopoietic system	140	115	2. 9	2. 6	1. 4	. 9	95. 7	96. 5
Other and ill-defined sites	187	136	44. 9	49. 3	27. 3	31. 6	27. 8	19. 1

[1] Total numbers of cases, excluding cases obtained from death certificates but including stage unknown, are given in table 3.

[2] Incorporated places of 2,500 population and over.

Figure 14. Percentage of cancer cases diagnosed during the study year which were localized at site of origin at time of diagnosis, by primary site.



[1] Excludes hematopoietic system and lymphatic tissue.

[2] Excludes malignancies of lymphatic tissue reported as primary in a specific organ; for example, lymphosarcoma of the stomach was coded to digestive system.

some in support of McKinnon's thesis (*52, 53*) that metastasis may frequently occur before the original growth reaches detectable size, and that the biological characteristics of the breast tumor are the controlling factor.

The greatest variability in stage of cancer was shown with regard to primary site (fig. 14). As an illustration, 49 percent of all cancers of the digestive system were diagnosed while localized, compared to 86 percent for buccal cavity. This variation occurred among specific sites within a system as well as among the major categories. For example, the 77 percent of cancers of the uterus diagnosed while localized may be contrasted with the 47 percent of localized cancers of the ovary. In general, the proportion of localized cases was higher for the more accessible sites, although there are biological factors other than accessibility which affect the results.

Morbidity surveys obviously cannot enumerate undiagnosed cases. However, the data on distribution of cancer cases by stage may be employed to fix a minimum estimate of the number of undiagnosed cases present in the population. It may be reasoned that cancer cases diagnosed as having progressed beyond the localized stage, during a given year, comprised a substantial segment of the undiagnosed cases of a preceding year. Case register experience has demonstrated that distribution of cases by stage remains fairly constant from one year to the next and that the results for one year may safely be projected to the next. These considerations lead to the conclusion that the number of undiagnosed cases present in the Iowa population during 1950 was at least equal to 36 percent of the 8,198 resident cases diagnosed during that year, or 2,950.

Survival Rates

To permit analysis with respect to survival after diagnosis, the names of cancer cases diagnosed for the first time in 1950 were checked against death certificate indexes of the division of vital statistics of the Iowa State Department of Health covering the period January 1, 1950–June 30, 1951. A small proportion of deaths in this cohort may have been missed through inability to match names and other identifying data on case reports and death certificates or because death occurred in some other State,[5] so that the reported findings may understate the true mortality to a small degree. Due to the limited period for which death certificate data were collected, the maximum span for

[5] Only 885 (3.3 percent) deaths from all causes of Iowa residents occurred outside the State in 1950 (*54*). Many of these were cleared directly through the division of vital statistics of the State health department, by the interstate exchange of death certificates.

which survival data can now be presented is 1 year; the observation period could readily be extended later to cover 5 years. The 12-month survival rates do allow for interesting comparisons of subgroups differentiated with respect to site, stage, sex, and place of residence. The practice of reckoning survival time from date first seen in the series of medical events leading to diagnosis has been followed. No other criterion, excepting actual date of diagnosis, seems to meet the practical requirements; certainly, it is not possible to fix time of onset or first symptoms accurately for the purpose of determining length of survival.

All survival rates presented in tables and charts for this section relate to newly diagnosed cases reported by hospitals and physicians, excluding those found by inspection of death certificates only. The inclusion of the latter group would have reduced the 12-month survival rate for all sites from .66 to .60. Since some of the cases obtained from death certificates were actually not diagnosed until death or shortly before, the first figure overstates the probability of survival after diagnosis. However, the second figure is too low because some of the death certificates represent patients actually diagnosed some time before death but never reported as cases. The true value lies between these extremes. The simplest approach to viewing survival curves adjusted for the inclusion of cases obtained from death certificate would be to read the initial value at zero months as p_o (when $1-p_o$ is the percentage reported by death certificate only) instead of 1.00, with the same proportionate displacement at succeeding points on the curve. All such adjusted curves would then parallel their counterparts plotted in figures 15 and 16 on a semilogarithmic scale. The issue of inclusion or exclusion of cases obtained from death certificates in the cohort at risk assumes less importance when primary interest is directed toward the slope and contour of the survival curves.

Seventy-five of every 100 Iowa residents with newly diagnosed cases of cancer lived for at least 6 months after diagnosis, and 66 were still alive at the end of 1 year. Excluding skin cancers, the corresponding figures for all remaining sites were somewhat lower, 70 and 60, respectively (table 16). Approximately three-fourths of the deaths were concentrated in the first half year, which reflects the high mortality rate in the period immediately after diagnosis, followed by stabilization at a lower rate as the extremely poor risks die off. It should be pointed out that the survival rates do not distinguish between deaths due to cancer and deaths due to other causes. The total population, not classified with respect to illness of any type, is also subjected to a measurable mortal-

Figure 15. Percentage of resident cancer cases diagnosed during the study year and surviving to end of month indicated, by sex and stage at diagnosis

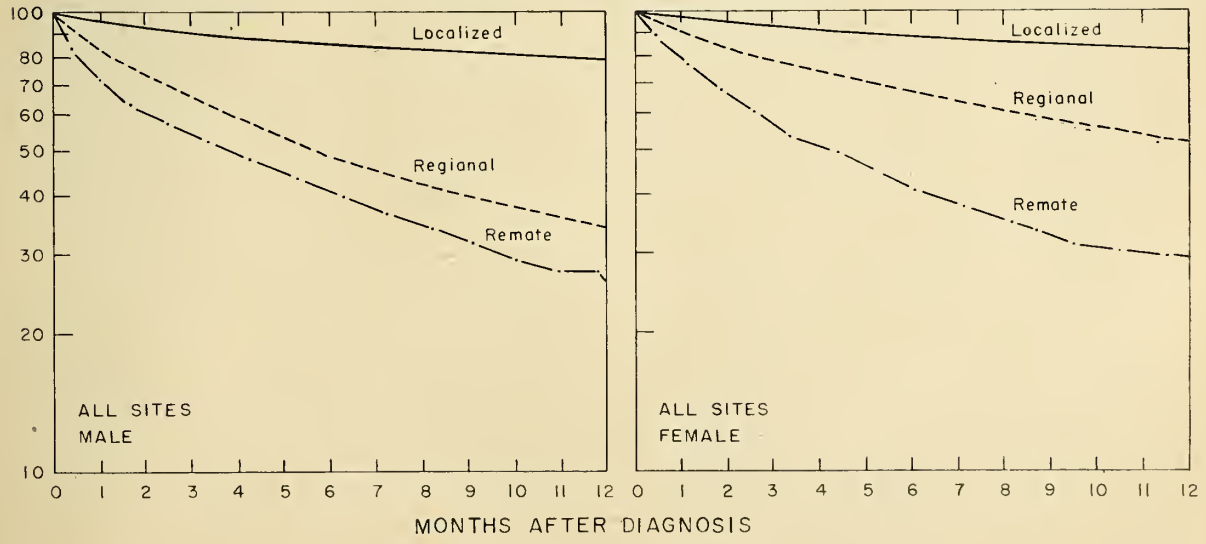
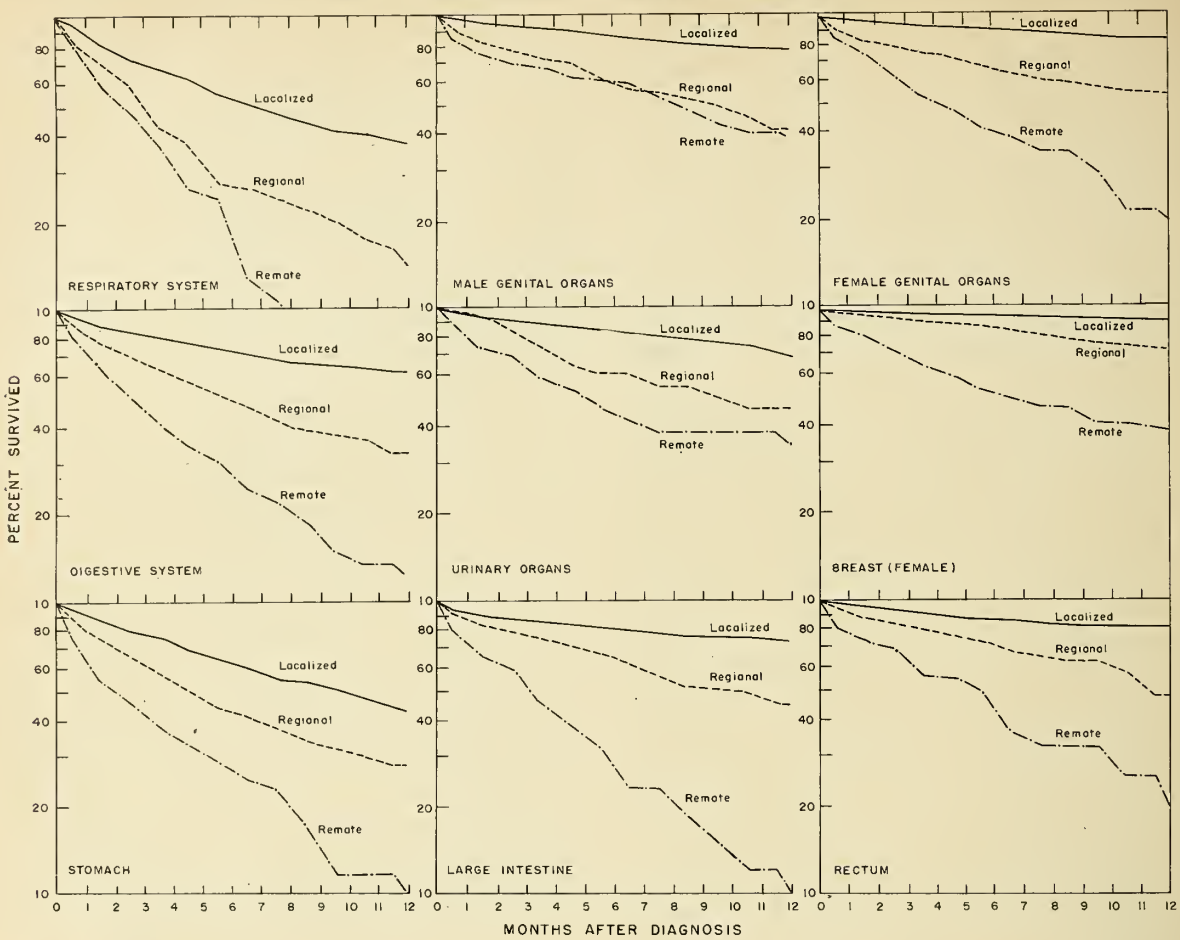


Figure 16. Percentage of resident cancer cases of selected sites diagnosed during the study year surviving to end of month indicated, by stage at diagnosis



ity risk. Taking into account the age and sex distribution of the cancer cases, about 96 percent of the patients would have been expected to survive 1 year if the general mortality experience of the Iowa population in 1950 had prevailed. The 12-month survival rate for diagnosed cancer cases adjusted for mortality expectations in the general population would be 69 percent (66 percent observed survivors ÷96 percent expected survivors), a relatively minor effect of 3 percentage points for the 1-year period. When survival information is presented for more extended observation periods the adjustment effect becomes more sizable and the data need to be adjusted systematically to take account of normal, expected mortality. The approach taken in Connecticut (*55*) and Saskatchewan (*56*) publications has been to correct the "crude" survival rates with division by "normal" survival, as expressed in appropriate life tables.

The Iowa survival experience was in general consistent with that reported in other cancer morbidity surveys, the 12-month survival figure of 66 percent for all sites agreeing closely with the average for whites in the 10 urban areas surveyed in 1947–48, 65 percent (*1–10*). This concordance extended to several major site groups, including digestive system, breast, male and female genital organs, urinary organs, and skin. Survival rates obtained from such surveys have consistently exceeded those secured from case register operations, in particular the one maintained by the Connecticut State Department of Health. The reasons for the discrepant results are not immediately apparent and this subject deserves further study.

Urban and Rural Cases

The 12-month survival rates for urban and rural residents were almost identical, 66.6 and 66.4 percent, respectively; practically no difference appeared when they were scrutinized by stage at diagnosis:

	Urban	*Rural*
Localized	73	76
Regional	45	45
Remote	27	29

There was a slight hint of a sex differential; the rural males showed more favorable survival prospects than urban males, whereas the reverse held true for females. Except for cancers of the respiratory system, there was little difference in the urban and rural survival rates when the cases were classed according to major site groups. For respiratory system cancers the survival rate was lower among urban cases (table 17). The similarity in the

Table 16. Percentage of resident cancer cases diagnosed during the study year surviving 6 and 12 months after diagnosis, by primary site and sex

Primary site and sex	Number of cases diagnosed	6-month survival	12-month survival
All sites	8, 198	74. 8	66. 3
Male	3, 993	72. 0	62. 7
Female	4, 205	77. 9	70. 1
All sites, excluding—			
Skin	6, 744	70. 2	60. 1
Lymphatic tissue and hematopoietic system	7, 727	76. 0	67. 6
Skin, lymphatic tissue, and hematopoietic system	6, 273	71. 2	61. 0
Buccal cavity and pharynx	470	91. 4	86. 0
Male	392	90. 6	84. 6
Female	78	96. 1	94. 5
Lip	249	97. 2	94. 8
Tongue	30	81. 6	71. 1
Salivary glands	63	93. 7	89. 6
Pharynx	42	71. 4	51. 4
Digestive system	1, 870	55. 6	42. 7
Male	990	52. 3	38. 9
Female	880	59. 4	47. 0
Esophagus	47	39. 4	13. 8
Stomach	474	45. 5	31. 2
Small intestine	28	50. 1	34. 4
Large intestine	621	68. 0	55. 2
Rectum	339	76. 7	65. 4
Liver	78	28. 2	14. 1
Gall bladder and biliary passages	78	28. 2	18. 2
Pancreas	159	32. 1	19. 5
Respiratory system	384	44. 5	32. 0
Male	283	40. 8	29. 4
Female	101	54. 4	39. 2
Lung and bronchus	336	37. 4	24. 8
Breast	976	87. 8	81. 0
Female genital organs	1, 006	83. 4	76. 0
Uterus [1]	759	87. 6	81. 6
Cervix	449	88. 3	81. 6
Corpus	158	92. 7	88. 4
Ovary	180	66. 6	53. 4
Male genital organs	542	77. 2	66. 0
Prostate	475	75. 7	64. 0
Urinary organs	412	77. 8	65. 3
Male	292	77. 0	62. 4
Female	120	79. 6	72. 6
Kidney	95	71. 1	60. 0
Bladder	309	79. 0	66. 0
Skin	1, 454	97. 3	95. 8
Male	905	98. 0	96. 2
Female	549	96. 2	95. 5
Brain and nervous system	101	46. 6	34. 5
Male	62	44. 4	33. 5
Female	39	50. 1	36. 2
Brain	89	41. 5	28. 9
Endocrine glands [2]	61	82. 6	71. 6
Male	24	77. 1	56. 7
Female	37	86. 5	83. 4
Thyroid	52	86. 6	76. 8
Bone	47	66. 1	56. 2
Male	29	69. 0	61. 4
Female	18	56. 2	47. 6
Soft tissue	54	90. 8	75. 3
Male	29	86. 3	80. 9
Female	25	96. 0	70. 7
Lymphatic tissue	197	74. 8	67. 6
Male	113	75. 6	66. 4
Female	84	73. 8	68. 7
Hematopoietic system	274	46. 0	34. 0
Male	158	49. 7	35. 8
Female	116	41. 4	32. 3

[1] Includes unspecified parts of uterus.

[2] Not elsewhere classified.

Table 17. Percentage of resident cancer cases diagnosed during the study year surviving 12 months after diagnosis, for selected primary site groups, urban [1] and rural areas

Primary site	Number of cases diagnosed		12-month survival		Ratio: Urban/ rural
	Urban	Rural	Urban	Rural	
All sites	4, 626	3, 572	66. 6	66. 4	1. 00
Male	2, 172	1, 821	61. 0	64. 6	. 94
Female	2, 454	1, 751	71. 4	68. 1	1. 05
Buccal cavity and pharynx	258	212	82. 2	90. 8	. 91
Digestive system	982	888	43. 6	41. 4	1. 05
Respiratory system	256	128	28. 6	37. 4	. 76
Breast	538	423	82. 8	79. 0	1. 05
Male genital organs	266	276	67. 8	63. 9	1. 06
Female genital organs	608	398	73. 8	79. 8	. 92
Urinary organs	245	167	64. 4	66. 2	. 97
Skin	840	614	96. 4	94. 2	1. 02

[1] Incorporated places of 2,500 population and over.

survival experience of patients from urban and rural areas does not lend support to any hypothesis concerning superiority in diagnosis and treatment among urban residents and would tend to discredit the idea that lower rural incidence rates for certain sites could be attributed to less complete coverage, accompanied by greater proportionate representation of late, and hence more easily diagnosed, cases in the rural areas.

Sex and Primary Site

Only part of the differential in favor of females for the overall 12-month survival experience can be assigned to differences in site distribution. These sex differentials appear uniformly when the data are examined by major site groups, stage, or age at diagnosis (up to 75 years).

Survival rates varied markedly with regard to primary site. Patients with cancer of the skin, buccal cavity, and breast had the most favorable 12-month rates (96, 86, and 81 percent), in contrast to those with cancer of the respiratory system, hematopoietic system, and brain and nervous system (32, 34, and 34 percent). Accessibility of the primary site would seem to play an important role in determining survival prospects.

The total experience for a major site group may conceal a wide range of variation within its component parts. For example, within the digestive system, the 12-month rates for esophagus, liver, gall bladder, and pancreas (14, 14, 18, 20 percent) were far less favorable than for large intestine and rectum (55 and 65 percent) (table 16).

Stage

Among the factors influencing survival rates, stage at diagnosis has the most pronounced effect. Of cancer cases diagnosed while localized, 81 percent survived 12 months compared to 45 percent with regional involvement and 27 percent with remote metastases. When skin cancer is excluded, the rate for localized cases dropped to 74 percent (table 18). The more rapidly growing tumors are probably less frequently diagnosed in a localized stage than are slow-growing tumors, so that classification by stage automatically introduces an additional element of partial differentiation by tumor grade. Survival experience is also influenced by the natural course of the disease since, even among untreated patients, more early than late cases would be expected to survive 1 year. The magnitude of the differences among survival curves by stage are so striking for a variety of sites that no one has seriously questioned the dictum that cases are treated more successfully while localized than in the more advanced stages.

For one site, breast, McKinnon (*52*) has challenged the conventional interpretation of survival rates by stage. He points out that breast cancer mortality has remained unchanged over a long span of years, even in areas where active cancer control programs have been introduced. His contention is that, for this site, metastasis can occur long before the growth is palpable and that staging merely reflects tumor grade. The upward trend in survival for localized breast cancer, McKinnon suggests, may be due to inclusion in later years of cases of doubtful malignancy. After reviewing the available evidence, Park and Lees (*57*) felt that it had not been proved that the 5-year survival rates for breast cancer had been affected by treatment. Kraus (*58*), looking at the same data reviewed by Park and Lees, concluded that there were four different studies demonstrating that early treatment of breast cancer was effective. Shimkin and associates have interpreted their data as showing that delay in treatment had an adverse effect on survival rates for breast cancer patients (*59*). A more direct and possibly less controversial measure of treatment effects may be secured from comparisons of treated and untreated (for nonmedical reasons) cases, and it is hoped that cancer registers will eventually accumulate sufficient data on untreated cases of cancer of the breast and of some of the other numerically important sites.

Uterus and large intestine are among the sites exhibiting the greatest range between survival rates for cases in the early and late stages and illustrate clearly the importance of early diagnosis. For cancer of the uterus the wide-scale application of diagnostic procedures, such as the

Table 18. Percentage of resident cancer cases diagnosed during the study year surviving 12 months after diagnosis, for selected primary sites, by stage at diagnosis

Primary site	All stages	Stage at diagnosis			Ratio: Localized/ remote
		Localized	Metastases		
			Regional	Remote	
All sites	66. 3	80. 8	45. 4	27. 3	3. 0
Male	62. 7	77. 9	34. 2	25. 6	3. 0
Female	70. 1	83. 4	52. 8	29. 4	2. 8
All sites, excluding—					
Skin	60. 1	74. 2	44. 8	27. 4	2. 7
Lymphatic tissue and hematopoietic system	67. 6	81. 0	44. 9	22. 6	3. 6
Skin, lymphatic tissue, and hematopoietic system	61. 0	74. 4	44. 6	22. 8	3. 3
Digestive system	42. 7	60. 6	32. 0	12. 0	5. 0
Male	38. 9	55. 6	28. 8	8. 7	6. 4
Female	47. 0	65. 9	35. 3	15. 1	4. 4
Stomach	31. 2	43. 2	27. 6	10. 3	4. 2
Large intestine	55. 2	73. 0	44. 5	10. 2	7. 2
Rectum	65. 4	81. 0	47. 4	19. 0	4. 3
Pancreas	19. 5	21. 1	17. 0	10. 4	2. 0
Respiratory system	32. 0	37. 0	14. 4	8. 0	4. 6
Lung and bronchus	24. 8	25. 7	13. 5	8. 0	3. 2
Breast (female)	81. 0	91. 0	72. 8	38. 6	2. 4
Female genital organs	76. 0	84. 6	54. 6	19. 8	4. 3
Uterus	81. 6	87. 8	59. 8	17. 4	5. 0
Ovary	53. 4	66. 5	45. 6	22. 8	2. 9
Male genital organs	66. 0	76. 9	40. 4	38. 0	2. 0
Prostate	64. 0	76. 2	39. 5	36. 0	2. 1
Urinary organs	65. 3	70. 7	45. 5	34. 9	2. 0

cytological test, offers the possibility of a really substantial saving in lives. On the other hand, it should be recognized that survival rates for certain sites, such as pancreas and lung and bronchus, are extremely poor, even when found in an early stage, so that early diagnosis without corresponding advances in treatment cannot be expected to produce numerically important savings in lives.

Histological Type

For a few sites—stomach, large intestine, rectum, lung and bronchus, breast, cervix, prostate—the Iowa data appeared extensive enough to permit further presentation of survival experience by histological type. With the exception of lung and bronchus and cervix these were all sites in which one histological type predominated, so that comparisons were reduced essentially to those between the predominant type and "unspecified tumors of epithelial origin." This latter group included undifferentiated-cell-type tumors as well as those for which specific information on histological type was not recorded. Some of the results are summarized in table 19, which gives the percentage of cases which survived 1 year after diagnosis.

Information on tumor grade was not collected systematically in the survey and cannot be considered in this discussion. However, the lower survival rates for the "unspecified" tumors suggest strongly that they included a sizable proportion of the more malignant undifferentiated tumors. The apparent exception provided by cervical cancers is accounted for by the inclusion of some carcinomas in situ, which have very high survival rates, in the "unspecified" category. The results thus seem consistent with clinical impressions. For both lung and bronchus and cervix, the survival rates for nonglandular epithelial cancers were slightly higher than for the adenocarcinomas. However, the numbers observed were small and no great significance should be attached to this observation.

Table 19. Percentage of cases of cancer of certain sites surviving 1 year after diagnosis, by histological type

Site	Adenocarcinoma (00–09)	Nonglandular epithelial carcinomas (11–14)	"Unspecified" carcinoma (18, 19)
Stomach	42 (183)	----	37 (49)
Large intestine	67 (387)	----	58 (49)
Rectum	69 (254)	----	60 (28)
Lung and bronchus	21 (37)	25 (45)	16 (101)
Breast	88 (661)	----	73 (165)
Cervix	76 (44)	83 (302)	91 (43)
Prostate	77 (208)	----	64 (78)

NOTE: Figures in parentheses indicate initial number of cases on which rates were based.

Comparison of Incidence and Mortality Data

Sex differences in cancer site-specific survival rates, although present, are not of large magnitude. Most persons infer from this fact that the relative sex liability to disease, as measured either by incidence or by mortality, should agree reasonably well. Examination of the 1950 age-adjusted rates, per 100,000 population, for some major site groups in Iowa (1950) seems to support this expectation (table 20).

Doubts have been expressed in reports issued by vital statistics offices concerning the significance to be attached to mortality rates classified by urban or rural residence. Because of the possibility of a greater inadequacy of both diagnoses and medical certifications of death in rural areas, investigators have been cautious in interpreting the reported urban-rural differentials in cancer mortality. The implication has been that such differences might disappear if intensive case-finding measures were undertaken.

Although morbidity surveys can also be affected by the availability and scope of

Table 20. Age-adjusted incidence and mortality rates per 100,000 population for some major site groups, Iowa, 1950

Site	Incidence			Mortality		
	Male	Female	Ratio: M/F	Male	Female	Ratio: M/F
Buccal cavity	27. 8	5. 6	5. 0	6. 4	1. 2	5. 3
Digestive system	77. 4	66. 8	1. 2	54. 3	42. 9	1. 3
Respiratory system	21. 6	7. 7	2. 8	15. 2	4. 7	3. 2
Urinary organs	20. 4	8. 4	2. 4	8. 9	2. 9	3. 1
Skin	61. 4	35. 3	1. 7	2. 4	1. 9	1. 3
Lymphatic tissue	9. 0	6. 3	1. 4	4. 7	3. 1	1. 5
Hematopoietic system	12. 7	9. 0	1. 4	9. 7	6. 6	1. 5

diagnostic procedures, it is interesting to note the close agreement in urban-rural ratios for each sex between incidence and mortality rates in Iowa. For most site groups, the correspondence turns out to be extremely close, skin proving the only real exception (table 21). The finding for the latter site is not too surprising since only a small fraction of skin cancers terminate fatally.

Part of the higher incidence of skin cancer in urban areas might be accounted for as follows. The proportion of microscopically confirmed skin cancers was lower among rural residents. Thus, it is possible that, among rural residents, some suspicious skin lesions were removed but were not submitted for histological examination, and in the absence of microscopic proof, these lesions were not definitely diagnosed as malignant and were not so reported in the survey.

As evidence of the unreliability of vital statistics data on cancer, instances have been cited in the clinical literature of grossly erroneous medical certifications of death, when these certifications were checked against autopsies and other medical records. Although extreme examples undoubtedly exist, in Iowa the agreement between death certificates and medical records with respect to the primary site of cancer was good (tables 22–24). In this respect, the Iowa results were generally consistent with those reported earlier by Dorn and

Table 21. Comparison of urban and rural age-adjusted cancer incidence and mortality rates, per 100,000 population, by primary site and sex

Primary site	Incidence			Mortality		
	Urban	Rural	Ratio: Urban/ rural	Urban	Rural	Ratio: Urban/ rural
	Males					
All sites	350. 6	250. 2	1. 40	155. 1	116. 2	1. 33
Buccal cavity and pharynx	32. 1	24. 1	1. 33	7. 8	5. 3	1. 47
Digestive system	87. 6	68. 7	1. 28	63. 2	46. 6	1. 36
Respiratory system	32. 8	12. 1	2. 71	22. 4	9. 1	2. 46
Genital organs	43. 5	39. 0	1. 12	18. 2	21. 0	. 87
Urinary organs	25. 1	16. 5	1. 52	10. 4	7. 6	1. 37
Skin	72. 1	52. 1	1. 38	2. 0	2. 8	. 71
Lymphatic tissue	12. 2	6. 1	2. 00	6. 2	3. 5	1. 77
Hematopoietic system	14. 4	11. 4	1. 26	10. 7	9. 0	1. 19
Other and unspecified sites	30. 8	20. 2	1. 52	14. 2	11. 3	1. 26
	Females					
All sites	351. 6	261. 5	1. 34	139. 4	111. 6	1. 25
Buccal cavity and pharynx	7. 2	4. 1	1. 76	1. 7	0. 8	2. 12
Digestive system	68. 5	65. 2	1. 05	42. 3	43. 3	. 98
Respiratory system	9. 0	6. 3	1. 43	5. 9	3. 5	1. 69
Breast	78. 0	62. 4	1. 25	28. 9	20. 4	1. 42
Genital organs	88. 7	59. 8	1. 48	32. 5	20. 2	1. 61
Urinary organs	10. 6	6. 1	1. 74	3. 3	2. 5	1. 32
Skin	45. 4	24. 9	1. 82	2. 2	1. 7	1. 29
Lymphatic tissue	7. 2	5. 5	1. 31	3. 4	2. 9	1. 17
Hematopoietic system	10. 9	7. 2	1. 51	7. 5	5. 8	1. 29
Other and unspecified sites	104. 1	82. 4	1. 26	40. 6	30. 9	1. 31

cytological test, offers the possibility of a really substantial saving in lives. On the other hand, it should be recognized that survival rates for certain sites, such as pancreas and lung and bronchus, are extremely poor, even when found in an early stage, so that early diagnosis without corresponding advances in treatment cannot be expected to produce numerically important savings in lives.

Histological Type

For a few sites—stomach, large intestine, rectum, lung and bronchus, breast, cervix, prostate—the Iowa data appeared extensive enough to permit further presentation of survival experience by histological type. With the exception of lung and bronchus and cervix these were all sites in which one histological type predominated, so that comparisons were reduced essentially to those between the predominant type and "unspecified tumors of epithelial origin." This latter group included undifferentiated-cell-type tumors as well as those for which specific information on histological type was not recorded. Some of the results are summarized in table 19, which gives the percentage of cases which survived 1 year after diagnosis.

Information on tumor grade was not collected systematically in the survey and cannot be considered in this discussion. However, the lower survival rates for the "unspecified" tumors suggest strongly that they included a sizable proportion of the more malignant undifferentiated tumors. The apparent exception provided by cervical cancers is accounted for by the inclusion of some carcinomas in situ, which have very high survival rates, in the "unspecified" category. The results thus seem consistent with clinical impressions. For both lung and bronchus and cervix, the survival rates for nonglandular epithelial cancers were slightly higher than for the adenocarcinomas. However, the numbers observed were small and no great significance should be attached to this observation.

Table 19. Percentage of cases of cancer of certain sites surviving 1 year after diagnosis, by histological type

Site	Adenocarcinoma (00–09)	Nonglandular epithelial carcinomas (11–14)	"Unspecified" carcinoma (18, 19)
Stomach	42 (183)	----------	37 (49)
Large intestine	67 (387)	----------	58 (49)
Rectum	69 (254)	----------	60 (28)
Lung and bronchus	21 (37)	25 (45)	16 (101)
Breast	88 (661)	----------	73 (165)
Cervix	76 (44)	83 (302)	91 (43)
Prostate	77 (208)	----------	64 (78)

NOTE: Figures in parentheses indicate initial number of cases on which rates were based.

Comparison of Incidence and Mortality Data

Sex differences in cancer site-specific survival rates, although present, are not of large magnitude. Most persons infer from this fact that the relative sex liability to disease, as measured either by incidence or by mortality, should agree reasonably well. Examination of the 1950 age-adjusted rates, per 100,000 population, for some major site groups in Iowa (1950) seems to support this expectation (table 20).

Doubts have been expressed in reports issued by vital statistics offices concerning the significance to be attached to mortality rates classified by urban or rural residence. Because of the possibility of a greater inadequacy of both diagnoses and medical certifications of death in rural areas, investigators have been cautious in interpreting the reported urban-rural differentials in cancer mortality. The implication has been that such differences might disappear if intensive case-finding measures were undertaken.

Although morbidity surveys can also be affected by the availability and scope of

Table 20. Age-adjusted incidence and mortality rates per 100,000 population for some major site groups, Iowa, 1950

Site	Incidence			Mortality		
	Male	Female	Ratio: M/F	Male	Female	Ratio: M/F
Buccal cavity	27. 8	5. 6	5. 0	6. 4	1. 2	5. 3
Digestive system	77. 4	66. 8	1. 2	54. 3	42. 9	1. 3
Respiratory system	21. 6	7. 7	2. 8	15. 2	4. 7	3. 2
Urinary organs	20. 4	8. 4	2. 4	8. 9	2. 9	3. 1
Skin	61. 4	35. 3	1. 7	2. 4	1. 9	1. 3
Lymphatic tissue	9. 0	6. 3	1. 4	4. 7	3. 1	1. 5
Hematopoietic system	12. 7	9. 0	1. 4	9. 7	6. 6	1. 5

diagnostic procedures, it is interesting to note the close agreement in urban-rural ratios for each sex between incidence and mortality rates in Iowa. For most site groups, the correspondence turns out to be extremely close, skin proving the only real exception (table 21). The finding for the latter site is not too surprising since only a small fraction of skin cancers terminate fatally.

Part of the higher incidence of skin cancer in urban areas might be accounted for as follows. The proportion of microscopically confirmed skin cancers was lower among rural residents. Thus, it is possible that, among rural residents, some suspicious skin lesions were removed but were not submitted for histological examination, and in the absence of microscopic proof, these lesions were not definitely diagnosed as malignant and were not so reported in the survey.

As evidence of the unreliability of vital statistics data on cancer, instances have been cited in the clinical literature of grossly erroneous medical certifications of death, when these certifications were checked against autopsies and other medical records. Although extreme examples undoubtedly exist, in Iowa the agreement between death certificates and medical records with respect to the primary site of cancer was good (tables 22–24). In this respect, the Iowa results were generally consistent with those reported earlier by Dorn and

Table 21. Comparison of urban and rural age-adjusted cancer incidence and mortality rates, per 100,000 population, by primary site and sex

Primary site	Incidence			Mortality		
	Urban	Rural	Ratio: Urban/ rural	Urban	Rural	Ratio: Urban/ rural
	Males					
All sites	350. 6	250. 2	1. 40	155. 1	116. 2	1. 33
Buccal cavity and pharynx	32. 1	24. 1	1. 33	7. 8	5. 3	1. 47
Digestive system	87. 6	68. 7	1. 28	63. 2	46. 6	1. 36
Respiratory system	32. 8	12. 1	2. 71	22. 4	9. 1	2. 46
Genital organs	43. 5	39. 0	1. 12	18. 2	21. 0	. 87
Urinary organs	25. 1	16. 5	1. 52	10. 4	7. 6	1. 37
Skin	72. 1	52. 1	1. 38	2. 0	2. 8	. 71
Lymphatic tissue	12. 2	6. 1	2. 00	6. 2	3. 5	1. 77
Hematopoietic system	14. 4	11. 4	1. 26	10. 7	9. 0	1. 19
Other and unspecified sites	30. 8	20. 2	1. 52	14. 2	11. 3	1. 26
	Females					
All sites	351. 6	261. 5	1. 34	139. 4	111. 6	1. 25
Buccal cavity and pharynx	7. 2	4. 1	1. 76	1. 7	0. 8	2. 12
Digestive system	68. 5	65. 2	1. 05	42. 3	43. 3	. 98
Respiratory system	9. 0	6. 3	1. 43	5. 9	3. 5	1. 69
Breast	78. 0	62. 4	1. 25	28. 9	20. 4	1. 42
Genital organs	88. 7	59. 8	1. 48	32. 5	20. 2	1. 61
Urinary organs	10. 6	6. 1	1. 74	3. 3	2. 5	1. 32
Skin	45. 4	24. 9	1. 82	2. 2	1. 7	1. 29
Lymphatic tissue	7. 2	5. 5	1. 31	3. 4	2. 9	1. 17
Hematopoietic system	10. 9	7. 2	1. 51	7. 5	5. 8	1. 29
Other and unspecified sites	104. 1	82. 4	1. 26	40. 6	30. 9	1. 31

Horn from cancer morbidity surveys in 10 urban areas conducted from 1938 to 1940 (*60*).

In Iowa, all cases of cancer reported by physicians and hospitals to be under treatment or observation were traced to June 30, 1951, to see if a death certificate had been filed. Death certificates were collected and coded for cause of death by the division of vital statistics of the Iowa State Department of Health and verified by the National Office of Vital Statistics. In this series, cancer (of some site) was reported to be the primary cause of death in 91.4 percent; in 5.3 percent, cancer was mentioned in the medical certification but was not considered the cause of death; and in 3.3 percent, no reference was made to cancer (table 22). In this connection, it should be remembered that cancer has received no automatic priority for assignment as the primary cause of death in vital statistics tabulations since the application

Table 22. Percentage distribution of cancer, by primary cause of death as stated on death certificate, according to primary site group on case report

Primary site on case report	Number of deaths	Primary cause of death		
		Cancer	Other	
			Cancer mentioned on death certificate	Cancer not mentioned on death certificate
All sites	4,548	91.4	5.3	3.3
Buccal cavity and pharynx	159	86.2	5.0	8.8
Digestive system	1,583	93.5	4.4	2.1
Respiratory system	330	97.0	.9	2.1
Breast	467	91.2	7.5	1.3
Female genital organs	482	94.8	2.7	2.5
Male genital organs	367	79.0	14.2	6.8
Urinary organs	249	91.6	5.6	2.8
Skin	124	78.2	11.3	10.5
Eye	10	100.0	0	0
Brain and nervous system	82	81.7	0	18.3
Endocrine glands [1]	24	79.2	4.2	16.6
Bone	41	95.1	2.5	2.4
Soft tissue	21	100.0	0	0
Lymphatic tissue	136	93.4	3.7	2.9
Hematopoietic system	264	94.0	4.9	1.1
Ill-defined sites	209	91.4	5.3	3.3

[1] Not elsewhere classified.

of the rules of the Manual of Joint Causes of Death (*61*) was abandoned in 1949. Current procedures rely on the attending physician's determination of the underlying cause in the sequence of events leading to death. Because of the advanced age of many cancer patients, it is not surprising that diseases of the circulatory system accounted for 39 percent of those deaths in which cancer was not the primary cause. The proportion of other causes was highest for sites with the most favorable survival rates, such as skin, and lowest for sites with the poorest prognosis, such as lung and bronchus. With the collection of additional death certificates over a more extended time period subsequent to diagnosis, a higher proportion of certificates reporting other causes of death would be expected, since patients who were cured or who achieved some equilibrium between treatment and tumor growth would be relatively more subject to an increased risk of death from other causes.

Tables 23 and 24 compare agreement on primary site distribution as ascertained from the morbidity reports and medical certifications of death. Both tables have been limited to deaths in which cancer figured as the primary (underlying) cause. Although tabulations of primary cause of death are the only ones routinely available from vital statistics offices, this does not constitute a serious restriction for the purpose of cancer studies, in view of the small percentage of deaths for which cancer is a contributory cause only. The inclusion of this latter group would not alter the interpretations reached from the inspection of the two tables. Although the tables cover the total Iowa experience, no differences were found when the data were analyzed by population subgroups. Almost identical results as to site agreement were reached when the cases were examined with respect to age, sex, and urban or rural residence.

The pattern of clustering for site group inconsistencies seemed numerically unimportant. One of the more obvious configurations of inconsistencies occurred between digestive system and female genital organs, which is not too surprising in view of the proximity of the organs. Inconsistencies between the two sources of information were generally compen-

Table 23. Percentage of death certificates that agreed with site classification on case report, according to primary site on case report: all reported cases and microscopically confirmed cases only

Primary site on case report	All reported cases			Microscopically confirmed cases		
	Number of deaths	Percent of death certificates with—		Number of deaths	Percent of death certificates with—	
		Same specific site	Same site group but different specific site		Same specific site	Same site group but different specific site
All sites	4, 158	78. 5	7. 2	2, 950	79. 2	7. 1
Buccal cavity and pharynx	137	51. 8	8. 8	112	54. 5	19. 7
Lip	24	58. 3	4. 2	18	61. 1	5. 6
Tongue	24	66. 7	20. 8	17	64. 7	29. 4
Salivary glands	11	63. 6	0	9	66. 7	0
Mouth, other	37	32. 4	16. 2	33	36. 4	18. 2
Pharynx	41	53. 7	0	35	60. 0	0
Digestive system	1, 481	79. 5	12. 9	942	79. 8	12. 2
Esophagus	52	90. 4	1. 9	41	87. 8	2. 4
Stomach	434	85. 3	8. 5	226	89. 8	4. 9
Small intestine	24	54. 2	29. 2	19	52. 6	26. 3
Large intestine	417	84. 7	9. 1	275	85. 8	8. 7
Rectum	194	70. 1	25. 3	159	69. 8	25. 2
Liver	87	65. 5	21. 8	31	64. 5	16. 1
Gall bladder and biliary passages	74	82. 4	9. 5	62	83. 9	9. 7
Pancreas and peritoneum	152	84. 9	7. 2	92	83. 7	7. 6
Other digestive	47	23. 4	46. 8	37	18. 9	43. 2
Respiratory system	320	90. 6	1. 6	214	92. 1	1. 9
Larynx	19	73. 7	5. 3	19	73. 7	5. 3
Lung and bronchus	294	92. 5	. 7	189	95. 2	. 5
Other respiratory	7	57. 1	28. 6	6	50. 0	33. 3
Breast	426	93. 0	----------	332	91. 9	----------
Female genital organs	457	66. 5	19. 3	383	67. 1	19. 6
Cervix uteri	202	66. 8	19. 8	177	67. 8	20. 9
Corpus uteri	35	34. 3	62. 9	30	26. 7	70. 0
Uterus, other and unspecified	58	67. 2	20. 7	32	71. 9	15. 6
Ovary	136	77. 2	5. 9	122	78. 7	5. 7
Other female genital organs	26	50. 0	23. 1	22	45. 5	22. 7
Male genital organs	290	90. 0	. 7	180	90. 6	. 6
Prostate	271	90. 8	. 4	164	92. 1	0
Other male genital organs	19	78. 9	5. 3	16	75. 0	6. 3
Urinary organs	228	87. 7	. 9	187	86. 6	. 5
Kidney	72	91. 7	0	49	91. 8	0
Bladder	154	85. 9	1. 3	136	84. 8	. 7
Other urinary	2	----------	----------	2	----------	----------
Skin	97	53. 6	----------	82	50. 0	----------
Eye	10	70. 0	----------	7	71. 4	----------
Brain and nervous system	67	91. 0	----------	56	92. 9	----------
Endocrine glands [1]	19	68. 4	----------	16	75. 0	----------
Bone	39	59. 0	----------	21	61. 9	----------
Soft tissue	21	33. 3	----------	19	0	----------
Lymphatic tissue	127	85. 8	----------	113	85. 0	----------
Hematopoietic system	248	93. 5	----------	196	94. 9	----------
Ill-defined sites	191	31. 9	----------	90	36. 7	----------

[1] Not elsewhere classified.

NOTE: Based on deaths in which cancer was recorded as the primary cause of death on the death certificate.

Specific primary site on case report	Specific primary site on death certificate																	
	All sites	Lip	Tongue	Salivary glands	Other mouth	Pharynx	Esophagus	Stomach	Small intestine	Large intestine	Rectum	Liver and gall bladder	Pancreas	Other digestive and peritoneum	Larynx	Lung and bronchus	Other respiratory	Breast
All sites	4,158	21	20	8	14	35	50	425	27	476	165	168	157	20	24	306	11	426
Lip	24	14	1							1						1		
Tongue	24		16	1		4				1					1			
Salivary glands	11			7					1							1		
Other mouth	37	1	3		12	2		1								1		
Pharynx	41					22	1	1		2					7			1
Esophagus	52						47	1										
Stomach	434	1					1	370	5	14	1	9	5	2		1		
Small intestine	24							1	13	3	1	1		1				
Large intestine	417							11	3	353	17	5	1	1		1		1
Rectum	194							2		47	136							
Liver and gall bladder	161							7	1	6	1	118	11					2
Pancreas	152							1	1	2		7	129			1		
Other digestive and peritoneum.	47							2		9	2	5	4	11				
Larynx	19					1									14	1		
Lung and bronchus	294					1		1		1						272	2	4
Other respiratory	7															2	4	
Breast	426							2		3		3				4		396
Cervix uteri	202							3		2		1				2	1	3
Corpus uteri	35																	1
Other and unspecified uterus.	58									1			1					
Ovary	136							2		6		1		1				1
Other and unspecified female genital organs.	26											1						
Prostate	271							1		2	2		1			2		
Other and unspecified male genital organs.	19															1		
Kidney	72							1						1				
Bladder and other urinary organs.	156									1								
Skin	97	3			1	1		2		1		2				1	3	
Eye	10														1			
Brain and nervous system.	67					1		1								1		
Endocrine glands	19	1				1									1	1		
Bone	39				1	1				1						1		1
Soft tissue	21										1	1		1				
Lymphatic tissue	127					1						1		1		1		
Hematopoietic system	248									1		1						
Ill-defined sites	191	1					1	15	3	19	4	12	5	1		11	1	16

NOTE: Based on deaths in which cancer was recorded as the primary cause of death on the death certificate.

satory as witnessed by the close agreement in site group totals determined from the morbidity reports and the medical certifications of cause of death. One aspect of cases classified to a specific site group in the morbidity survey which turned up in other and unclassified sites on death certificates deserves comment. Medical certifications are very concise and compact and often information needed for an accurate classification is missing, thereby throwing the death classification to a less precise rubric. This situation was particularly marked for buccal cavity. Here the difficulty was the lack of provision for an unspecified category within the buccal cavity and pharynx group. Mention of two detailed sites within this major group on the death certificate without specifying one as primary resulted in classification to "other and unspecified sites." These data suggest that further queries on incomplete medical certifications would be rewarding for a substantial number of cases.

The International List (*62*) subdivides lung and bronchus into two categories: (*a*) specified as primary, and (*b*) unspecified as to whether primary or secondary. Lung and bronchus cases fall into a third classification when specified as secondary. Some investigators have maintained that the unspecified group should not be included in presentations of lung

Specific primary site on death certificate—Continued																		Specific primary site on case report
Cervix uteri	Corpus uteri	Other and unspecified uterus	Ovary	Other and unspecified female genital organs	Prostate	Other and unspecified male genital organs	Kidney	Bladder and other urinary organs	Skin	Eye	Brain and nervous system	Endocrine glands	Bone	Soft tissue	Lymphatic tissue	Hematopoietic system	Ill-defined sites	All sites	
149	22	115	134	15	276	17	79	140	72	15	67	19	37	13	141	240	254	4,158	All sites.
									1							1	5	24	Lip.
																	1	24	Tongue.
													1				1	11	Salivary glands.
									3				4				10	37	Other mouth.
															1		6	41	Pharynx.
																	4	52	Esophagus.
1					4		1								4		15	434	Stomach.
															3		1	24	Small intestine.
2		2	2		1				1		1		1		1		13	417	Large intestine.
					1											1	7	194	Rectum.
		2	1							1							11	161	Liver and gall bladder.
			1									1			2		7	152	Pancreas.
			5											1	1		7	47	Other digestive and peritoneum.
							1										2	19	Larynx.
							4				1				4		4	294	Lung and bronchus.
																	1	7	Other respiratory.
		2	2				1		1				1				11	426	Breast.
135	1	36	2	1			1	1				1	1			1	10	202	Cervix uteri.
3	12	19																35	Corpus uteri.
6	5	39	1												1		4	58	Other and unspecified uterus.
1	2	5	105														12	136	Ovary.
1	1	2	2	13			1	1	1								3	26	Other and unspecified female genital organs.
					246	1		4	3			1				1	7	271	Prostate.
					1	15											2	19	Other and unspecified male genital organs.
							66					1					3	72	Kidney.
					13		2	134				1					5	156	Bladder and other urinary organs.
			1	1	2		1		52	4	1		2	2	1	1	15	97	Skin.
									1	7							1	10	Eye.
									1		61			1			1	67	Brain and nervous system.
									1		1	13						19	Endocrine glands.
		1			1								23		2	1	6	39	Bone.
		1									1		1	7			8	21	Soft tissue.
										2			1	2	109	2	7	127	Lymphatic tissue.
															11	232	3	248	Hematopoietic system.
	1	6	12		7	1	1		7	1	1	1	2		1		61	191	Ill-defined sites.

See note on opposite page.

cancer mortality, since site of origin is in question. Such a stand seems unjustified in light of the Iowa experience. It seems clear that when physicians report lung and bronchus without qualification as to primary or secondary site, they mean to imply that this is the primary site, following their usage for other sites.

A more severe test of agreement on detailed site has been incorporated in table 24. In case of disagreement the fair presumption is that the morbidity information is usually more accurate, since the records are more complete and information on treatment and on observation of the course of disease is available. This would be true particularly for microscopically confirmed cases, and table 23 indicates clearly no essential difference in results for microscopically confirmed cases only, when compared to those for all diagnosed cases. Reasons for disagreement, other than undue compression of medical certifications and the necessity for special coding rules to handle this situation, include changes in attending physician or other circumstances resulting in unavailability of complete data to the physician signing the death certificate, and the incomplete resolution of the diagnosis in the physician's mind because of conflicting evidence. One may conclude that the nature of the agreement on primary site and the distribution of compensatory errors

is such that mortality tabulations yield serviceable data for major site groups and for several of the more important detailed sites.

These comparisons suggest that intensive analyses of mortality data in areas where the quality of medical certification is good may provide better leads for epidemiological studies than hitherto suspected. While the need for collection of morbidity data will always remain, the epidemiological possibilities inherent in routinely collected mortality data may have been overdiscounted in the past.

Hospitalization

Cancer treatment requires elaborate and time-consuming medical and hospital facilities. From the standpoint of the community, the individual patient, and medical institutions, it presents serious economic and medical logistics problems. For planning purposes, there are frequent requests for data on length of hospital stay for cancer patients. Such information is more meaningful than hospital cost data, since per diem costs, which are readily obtainable, vary by location and type of institution and, moreover, have been increasing steadily during the postwar years. Data on this subject were collected in Iowa, continuing the practice followed in the recent 10-city morbidity surveys (*1–10*).

During 1950, 6,979 resident and nonresident cases of cancer were hospitalized for a total of 159,316 days.[6] This group accounted for 6.5 percent of the approximately 2,458,000 patient-days of care provided by general hospitals in Iowa during 1950 (*63*). This is a minimum estimate of the load placed upon inpatient facilities by the cancer problem, since the data excluded suspected cases of cancer admitted to hospitals for diagnosis and found to be negative.

Cancer patients in Iowa were hospitalized for an average of 23 days during 1950, a figure lower than that reported for most of the 10 cities in the earlier surveys (*1–10*). Within Iowa the average stay was identical for patients admitted from urban and rural areas. The average stay did vary according to site (table 25). For example, patients with respiratory cancer were hospitalized for an average of 31 days; the corresponding figure for breast cancer patients was 17 days. Digestive system alone accounted for about one-third of the total hospital-days and breast and female genital organs combined accounted for an additional 25 percent.

Of the 8,198 resident cases newly diagnosed in 1950 (excluding cases reported by death

Table 25. Resident and nonresident cases of cancer hospitalized in 1950, by primary site and average lengt of stay in hospital

Primary site	Patients hospitalized	Average number of hospital-days per patient	Total hospital-days	
			Number	Percent
All sites	6, 979	23	159, 316	100. 0
Male	3, 226	25	80, 682	50. 6
Female	3, 753	21	78, 634	49. 4
Urban [1] [2]	3, 719	23	87, 267	57. 6
Rural [1]	2, 827	23	64, 151	42. 4
Buccal cavity and pharynx	281	22	6, 316	4. 0
Digestive system	1, 880	26	48, 388	30. 3
Respiratory system	356	31	11, 180	7. 0
Breast	1, 052	17	18, 189	11. 4
Female genital organs	1, 039	22	22, 406	14. 1
Male genital organs	569	23	12, 906	8. 1
Urinary organs	517	22	11, 613	7. 3
Skin	387	22	8, 464	5. 3
Eye	20	12	242	. 2
Brain and nervous system	87	32	2, 810	1. 8
Endocrine glands [3]	45	17	787	. 5
Bone	48	25	1, 180	. 7
Soft tissue	39	16	607	. 4
Lymphatic tissue	173	23	4, 064	2. 6
Hematopoietic system	285	23	6, 449	4. 0
Ill-defined sites	201	18	3, 715	2. 3

[1] Iowa residents only.
[2] Urban includes all incorporated places of 2,500 population and over.
[3] Not elsewhere classified.

[6] This excludes time spent in nursing and convalescent homes; hospital outpatient visits were excluded as well.

Table 26. Resident cases of cancer diagnosed and hospitalized in 1950, by primary site and duration of first hospitalization

Primary site	Patients hospitalized	Duration of first hospitalization				
		Average number of days	Percentage distribution			
			Less than 10 days	10–19 days	20–29 days	30 days and over
All sites	4, 854	20	37. 8	32. 9	12. 1	17. 2
Male	2, 212	22	37. 8	28. 9	13. 4	19. 9
Female	2, 642	18	37. 9	36. 2	11. 0	14. 9
Urban	2, 756	20	38. 9	31. 8	11. 9	17. 4
Rural	2, 098	19	36. 2	34. 3	12. 4	17. 1
Localized	2, 437	18	38. 4	33. 9	11. 7	16. 0
Regional involvement	1, 180	21	29. 7	36. 9	14. 3	19. 1
Remote metastases	589	25	37. 8	27. 0	12. 4	22. 8
Stage not reported	648	16	50. 0	27. 2	9. 4	13. 4
Buccal cavity and pharynx	171	17	54. 4	18. 1	11. 7	15. 8
Digestive system	1, 407	23	24. 8	33. 8	18. 5	22. 9
Respiratory system	272	29	37. 2	25. 4	9. 2	28. 2
Breast	720	14	42. 1	43. 4	6. 8	7. 7
Female genital organs	724	17	41. 9	33. 4	9. 1	15. 6
Male genital organs	369	22	39. 5	31. 7	10. 0	18. 8
Urinary organs	326	19	39. 6	33. 9	11. 3	15. 2
Skin	252	14	51. 4	31. 8	8. 4	8. 4
Eye	9	12	55. 6	33. 3	0	11. 1
Brain and nervous system	65	32	20. 0	27. 6	15. 4	37. 0
Endocrine glands [1]	36	17	47. 1	33. 3	5. 6	14. 0
Bone	26	18	54. 0	19. 2	7. 6	19. 2
Soft tissue	27	14	48. 2	25. 9	11. 1	14. 8
Lymphatic tissue	97	14	48. 5	23. 7	18. 5	9. 3
Hematopoietic system	191	18	50. 3	26. 1	7. 9	15. 7
Ill-defined sites	162	18	46. 8	27. 2	12. 3	13. 7

[1] Not elsewhere classified.

certificate only), 4,854, or 59.2 percent, were hospitalized within 1 year after diagnosis. Excluding skin cancers, the percentage was 68.2; this rate of hospitalization was lower than the 77.2 percent reported from the 10-city surveys (1947 and 1948). These data understate slightly the proportion of resident cancer patients hospitalized, since some cases diagnosed late in 1950 were undoubtedly hospitalized in 1951.

The first course of hospitalization for newly diagnosed cases (95,007 days) amounted roughly to three-fifths of the total hospital-days (151,418) devoted to cancer treatment of all Iowa residents in 1950. The average duration of first hospitalization was 20 days. Cases diagnosed as localized or with regional involvement required less time in the hospital than those with remote metastases. Slightly more than 70 percent of the patients were hospitalized for less than 20 days; for 38 percent, the stay was less than 10 days. Patients with cancer of the respiratory system or of the brain and central nervous system remained hospitalized longer than patients with cancer of other sites (table 26).

A fundamental aim of public health cancer control activities has been to reduce the interval between diagnosis and treatment. Some insight as to progress achieved in this regard may be gained by examining the time lag between the date the patient is first seen with cancer and the date of hospital admission recorded for newly diagnosed resident cases (table 27). Eighty-two percent of these cases were hospitalized within 1 month after diagnosis. This percentage may be somewhat overstated since,

Table 27. Percentage distribution of resident cancer cases diagnosed in 1950 and hospitalized within 12 months after diagnosis, by primary site and time interval between date first seen and date of hospitalization

Primary site	Number patients hospitalized	Percent hospitalized in stated time interval between date first seen and date hospitalized			
		Less than 1 month	1–2 months	2–3 months	3 or more months
All sites	4, 854	82. 4	9. 0	3. 2	5. 4
Male	2, 212	81. 5	9. 1	3. 2	6. 2
Female	2, 642	82. 9	9. 0	3. 3	4. 8
Urban	2, 756	83. 2	8. 8	2. 9	5. 1
Rural	2, 098	81. 2	9. 3	3. 6	5. 9
Buccal cavity and pharynx	171	77. 7	12. 9	4. 1	5. 3
Digestive system	1, 407	82. 7	7. 8	3. 0	6. 5
Respiratory system	272	79. 1	11. 4	4. 0	5. 5
Breast	720	84. 2	9. 2	3. 5	3. 1
Female genital organs	724	81. 3	11. 2	3. 2	4. 3
Male genital organs	369	85. 1	8. 7	2. 4	3. 8
Urinary organs	326	84. 1	6. 4	3. 1	6. 4
Skin	252	79. 8	9. 1	4. 0	7. 1
Eye	9	88. 9	11. 1	0	0
Brain and nervous system	65	84. 6	7. 7	3. 1	4. 6
Endocrine glands [1]	36	75. 1	8. 3	8. 3	8. 3
Bone	26	80. 8	7. 7	3. 8	7. 7
Soft tissue	27	77. 8	7. 4	0	14. 8
Lymphatic tissue	97	74. 2	10. 3	5. 2	10. 3
Hematopoietic system	191	82. 7	8. 4	3. 1	5. 8
Ill-defined sites	162	85. 1	7. 4	1. 9	5. 6

[1] Not elsewhere classified.

in a large proportion of cases, information on date first seen was obtained from the hospital record. No differences appeared when the data were examined with respect to sex or urban-rural residence. Examination of the results by primary site showed little difference, except that 15 percent of cancers of soft tissue and 10 percent of cancers of lymphatic tissue were not hospitalized until more than 3 months had elapsed since diagnosis.

Summary

Of each 100,000 Iowa residents, 509 persons had cancer during 1950; 347 of these were first diagnosed during the year. Females had a slightly higher incidence rate than males. When adjustments are made for the age distribution of the population, the Iowa incidence rate for all sites excluding skin, 253, was 12 and 9 percent below the respective figures for the combined 10 cities (286) and the 4 northern cities (277) recently surveyed by the National Cancer Institute. Much of this differential can be attributed to a lower rate in rural Iowa. The rate for urban Iowa agreed well with that reported for the four northern cities.

In Iowa, 76 percent of the newly diagnosed cancer cases were confirmed microscopically. This was essentially the same as the combined figure from surveys of the 10 urban areas. The urban-rural differential in this respect was small—77 percent contrasted to 73 percent—which suggested about equal reliability of diagnoses in the two population groups. In view of the proportion of cases with microscopic confirmation in Iowa, it may be noted

that most comparisons and inferences drawn from the Iowa data remained essentially unchanged, whether based on total newly diagnosed cases or solely on those meeting exacting diagnostic criteria.

Among Iowa males, cancer occurred most frequently in the digestive system, skin, genital organs, buccal cavity, and respiratory system. Among females, the order was genital organs, breast, digestive system, and skin. The leading specific sites for males were prostate, stomach, large intestine, and lung; for females, breast, cervix, and large intestine.

Incidence rates in the urban population were higher than in the rural population for such primary sites as lung, larynx, and cervix. Several lines of indirect evidence, based partly on examination of the data for internal consistency, support the hypothesis that these differences are real. There was little difference in the incidence of cancer of the corpus uteri, breast, prostate, and digestive system among urban and rural residents.

Excluding cancers of the lymphatic tissue and the hematopoietic system, two-thirds of the newly diagnosed cancers were localized at time of diagnosis. One of four had spread to adjacent tissue or regional lymph nodes, and 1 of 10 had metastasized to remote tissues. More cancers in males were diagnosed while localized (71 percent, excluding lymphatic tissue and hematopoietic system) than in females (63 percent). This resulted not from a systematic sex differential for certain sites but from the preponderance of breast cancer among women, for which the probability of early diagnosis has been relatively poor. The greatest variation in stage at diagnosis was shown with regard to primary site. To illustrate, only 49 percent of cancers involving the digestive system were diagnosed while localized compared to 86 percent for buccal cavity. In general, the proportion of localized cases was higher for the more accessible sites.

Of every 100 residents with newly diagnosed cancer in Iowa, 75 were alive 6 months after diagnosis, and 66 were still alive after 1 year. There was no difference in the urban and rural experience with respect to survival. Stage at diagnosis had the most pronounced effect on survival rates. Of cancer cases diagnosed while localized, 81 percent survived 12 months as contrasted to 45 percent of those with regional involvement and 27 percent with remote metastasis. Uterus and large intestine are among the sites exhibiting the greatest range in survival rates for cases in early and late stages. Survival rates for certain sites, such as pancreas and lung, are extremely poor even when diagnosed early.

With respect to primary site of cancer, agreement between data on medical records and on death certificates was good. For most primary sites, comparisons between urban and rural areas based on incidence and mortality rates were in close agreement.

Morbidity data reported from Denmark generally show findings similar to those from Iowa with respect to urban-rural differentials. Both showed substantial differentials in incidence for all sites combined (exclusive of skin, lymphatic tissue, and hematopoietic system). For lung and bronchus, both sets of data exhibited a much more pronounced urban-rural differential among males. They agreed on two distinct urban-rural patterns for cervix and corpus uteri. Neither the Danish nor Iowa data supported impressions of higher skin cancer incidence rates among rural populations as reported in medical textbooks.

The age and sex patterns of cancer incidence in Iowa conformed generally to those reported from morbidity surveys elsewhere. Incidence of cancer increased rapidly during late adult life for both sexes. Although female rates for all ages combined exceeded those for males, females experienced lower rates at ages under 10 and over 65.

Although most cancers tend to appear in late adult life, some forms occur relatively frequently among young people. Less than 5 percent of the newly diagnosed cases in Iowa occurred among persons under 35, whereas one-fourth of cancers of the brain and endocrine glands, not elsewhere classified, and one-fifth of those for bone and hematopoietic system were in this age group.

Carcinoma constituted 86 percent of the newly diagnosed, microscopically confirmed cases of cancer in Iowa, a figure in close agreement with that from the 10-city morbidity

surveys. Within Iowa there was no difference in this respect between urban and rural residents. Adenocarcinoma was more frequent among females, whereas epidermoid carcinoma was the leading type among males. One site—breast—accounted for much of the preponderance of adenocarcinomas among females. Leukemia was the most frequent histological type encountered at ages under 15. Thereafter, carcinomas became increasingly predominant.

During 1950, 6,979 cancer patients were hospitalized for a total of 159,316 days, an average of 23 days per patient. The average length of stay did not differ for patients from urban and rural areas. Cancers of the digestive system alone accounted for about one-third of the total hospital days. Of the newly diagnosed resident cases, 59.2 percent were hospitalized within 1 year after diagnosis. The first course of hospitalization for newly diagnosed cases accounted roughly for three-fifths of the total hospital days devoted to cancer treatment. The average duration of first hospitalization was 20 days.

References

(*1*) Cutler, S. J.: Cancer illness among residents in Atlanta, Georgia, 1947. Public Health Service Pub. No. 13. Cancer Morbidity Series No. 1. Washington, D. C., U. S. Government Printing Office, 1950.

(*2*) Grodowitz, W.: Cancer illness among residents of San Francisco and Alameda Counties, California, 1947. Public Health Service Pub. No. 65. Cancer Morbidity Series No. 2. Washington, D. C., U. S. Government Printing Office, 1951.

(*3*) Warran, I. I.: Cancer illness among residents of New Orleans, Louisiana, 1947. Public Health Service Pub. No. 67. Cancer Morbidity Series No. 3. Washington, D. C., U. S. Government Printing Office, 1951.

(*4*) Marcus, S. C.: Cancer illness among residents of Denver, Colorado, 1947. Public Health Service Pub. No. 112. Cancer Morbidity Series No. 4. Washington, D. C., U. S. Government Printing Office, 1951.

(*5*) Cutler, S. J.: Cancer illness among residents of Pittsburgh, Pennsylvania, 1947. Public Health Service Pub. No. 126. Cancer Morbidity Series No. 5. Washington, D. C., U. S. Government Printing Office, 1951.

(*6*) Cutler, S. J.: Cancer illness among residents of Chicago, Illinois, 1947. Public Health Service Pub. No. 152. Cancer Morbidity Series No. 6. Washington, D. C., U. S. Government Printing Office, 1952.

(*7*) Marcus, S. C.: Cancer illness among residents of Dallas, Texas, 1948. Public Health Service Pub. No. 178. Cancer Morbidity Series No. 7. Washington, D. C., U. S. Government Printing Office, 1952.

(*8*) Marcus, S. C.: Cancer illness among residents of Birmingham, Alabama, 1948. Public Health Service Pub. No. 216. Cancer Morbidity Series No. 8. Washington, D. C., U. S. Government Printing Office, 1952.

(*9*) Cutler, S. J., and Rowan, J. C.: Cancer illness among residents of Detroit, Michigan, 1948. Public Health Service Pub. No. 217. Cancer Morbidity Series No. 9. Washington, D. C., U. S. Government Printing Office, 1952.

(*10*) Cutler, S. J., and Marcus, S. C.: Cancer illness among residents of Philadelphia, Pennsylvania, 1948. Public Health Service Pub. No. 244. Cancer Morbidity Series No. 10. Washington, D. C., U. S. Government Printing Office, 1952.

(*11*) Births by race and geographic subdivision. National Office of Vital Statistics, Vital Statistics—Special Reports, 37: 525–538 (1954).

(*12*) Stocks, P.: Regional and local differences in cancer death rates. General Register Office, London, England, 1947.

(*13*) Stocks, P.: Endemiology of cancer of the lung in England and Wales. Brit. J. Cancer. 6: 99–111 (1952).

(*14*) Stocks, P.: Cancer and the community. Brit. Med. J. 2: 847–850 (1953).

(*15*) Kennaway, E. L., and Kennaway, N. M.: Studies of the incidence of cancer of the lung and larynx. Brit. J. Cancer 5: 153–158 (1951).

(*16*) Kennaway, E. L., and Waller, R. E.: Studies on cancer of the lung. Acta Unio Internat. Contra Cancrum. 9: 485–494 (1953).

(*17*) Curwen, M. P., Kennaway, E. L., and Kennaway, N. M.: The incidence of cancer of the lung and larynx in urban and rural districts. Brit. J. Cancer 8: 181–198 (1954).

(*18*) Legon, C. D.: A note on geographic variations in cancer mortality. Brit. J. Cancer 5: 175–179 (1951).

(*19*) Logan, W. P. D.: Social class variations in mortality. Pub. Health Rep. 69: 1217–1223 (1954).

(*20*) Gover, M.: Cancer mortality in the United States. Pub. Health Bull. Nos. 248, 252, 257, and 275. Washington, D. C., U. S. Government Printing Office, 1939 to 1941.

(*21*) Spiegelman, M.: Demographic differentials in cancer mortality in urban and rural areas of the United States, 1940. National Office of Vital Statistics. Vital Statistics—Special Reports. 33: 239–254 (1952).

(*22*) Cancer mortality in the United States. National Office of Vital Statistics. Vital Statistics—Special Reports 32: 3–284 (1949 and 1950).

(*23*) Clemmesen, J., and Busk, T.: Cancer mortality among males and females in Denmark, England, and Switzerland. IV. Mortality of accessible and inaccessible cancers in Danish towns and rural areas. V. Incidence of accessible and inaccessible cancers in Danish towns and rural areas. Cancer Research 9: 411–421 (1949).

(*24*) Clemmesen, J., Nielsen, A., and Jensen, E.: Mortality and incidence of cancer of the lung in Denmark and some other countries. *In* Cancer of the lung. A symposium edited by Dr. J. Clemmesen, reprinted from Acta Unio Internat. Contra Cancrum pp. 177–210 (1953).

(*25*) Clemmesen, J., and Nielsen, A.: Age distribution figures for cancer in Danish towns and country, 1943 to 1947. Acta Unio Internat. Contra Cancrum. 8: 140–159 (1952).

(*26*) Griswold, M. H., Wilder, C. S., Cutler, S. J., and Pollack, E. S.: Cancer in Connecticut, 1935 through 1951. Hartford, Connecticut State Department of Health, 1956.

(*27*) Levin, M. L., Kress, L. C., and Goldstein, H.: Syphilis and cancer. Reported syphilis prevalence among 7,761 cancer patients. New York State J. Med. 42: 1737–1745 (1942).

(*28*) Young, M., and Russell, W. T.: An investigation into the statistics of cancer in different trades and professions. Medical Research Council Spec. Rep. No. 99. London, His Majesty's Stationery Office, 1926.

(*29*) Hammond, E. C., and Horn, D.: The relationship between human smoking habits and death rates. J. A. M. A. 155: 1316–1328 (1954).

(*30*) Taylor, G. W.: Cancer of the mouth in women. New England J. Med. 210: 1102–1105 (1934).

(*31*) Results of serological blood tests for syphilis on selective service registrants. Federal Security Agency, U. S. Pub. Health Service in cooperation with Federal Works Agency, Work Projects Administration, 1942. Pp. 425.

(*32*) Steiner, P. E.: Cancer: Race and geography. Baltimore, The Williams & Wilkins Co., 1954. Pp. 363.

(*33*) Rhea, T. R.: Gastric cancer mortality in Hawaii. Hawaii Med. J. 13: 107–112 (1953).

(*34*) Hueper, W. C.: Environmental lung cancer. Indust. Med. & Surg. 20: 49–62 (1951).

(*35*) Doll, R.: Mortality from lung cancer among nonsmokers. Brit. J. Cancer. 7: 303–312 (1953).

(*36*) Summarized in Dorn, H. F.: The relationship of cancer of the lung and the use of tobacco. The Am. Statistician 8: 7–13 (Dec. 1954).

(*37*) Graham, E. A.: Primary cancer of the lung with special consideration of its etiology. Bull. N. Y. Acad. Med. 27: 261–276 (1951).

(*38*) Dorn, H. F.: The statistical approach to the epidemiology of cancer. Proceedings of the Second National Cancer Conference 2: 1103–1120. New York, N. Y. Am. Cancer Soc. (1954).

(*39*) Denoix, P. F., and Moine, M.: Relations entre l'activité génitale et la fréquence des décès par cancer de l'uterus et du sein. Bulletin de l'Institut National d'Hygiène. 6: 585–589 (1951).

(*40*) Peller, S.: Cancer and its relations to pregnancy, to delivery, and to marital and social status: I. Cancer of the breast and genital organs. Surg., Gynec. & Obst. 71: 1–8 (1940).

(*41*) Davidsohn, I.: Cancer among Jews. Medical Leaves (Chicago, Medical Leaves, Inc.) 1939, pp. 19–27.

(*42*) Speert, H.: Corpus cancer. Cancer. 1: 584–603 (1948).

(*43*) Treusch, J. V., Hunt, A. B., and Rousuck, A. A.: Infrequency of carcinoma of the uterine cervix among Jewish women. Am. J. Obst. & Gynec. 52: 162 (1946).

(*44*) Wynder, E. L., Cornfield, J., Shroff, P. D., and Doraiswami, K. R.: A study of environmental factors in carcinoma of the cervix. Am. J. Obst. & Gynec. 68: 1016–1052 (1954).

(*45*) Dorn, H. F.: Cancer and marital status. Human Biology 15: 73–79 (1943).

(*46*) Dorn, H. F., and Cutler, S. J.: Morbidity from cancer in the United States. Pub. Health Monograph No. 29. Washington, D. C., U. S. Government Printing Office, 1955.

(*47*) Gilliam, A. G.: Fertility and cancer of the breast and of the uterine cervix. J. Nat. Cancer Inst. 12: 287–304 (1951).

(*48*) Korteweg, R.: The age curve in lung cancer. Brit. J. Cancer. 5: 21–27 (1951).

(*49*) Dorn, H. F.: The increase in cancer of the lung. Indian Med. & Surg. 23: 253–257 (1954).

(*50*) Blum, H. F.: Sunlight as a causal factor in cancer of the skin of man. J. Nat. Cancer Inst. 9: 247–258 (1948).

(*51*) American Cancer Society: Manual of tumor nomenclature and coding. New York, N. Y., The Society, 1951, pp. 119.

(*52*) McKinnon, N. E.: Cancer mortality. The failure of control through case-finding programs. [A summary.] Surg., Gynec., & Obst. 94: 173–178 (1952).

(*53*) McKinnon, N. E.: Control of cancer mortality. *In* Letters to the editor. The Lancet. 1: 1188–1189 (1954).

(*54*) U. S. National Office of Vital Statistics: Vital statistics of the United States, vol. 3, table 43. 1950.

(*55*) Pollack, E. S.: The effect of age and site on life expectancy of cancer patients. Conn. Health Bull. 68: 193–200 (1954).

(*56*) Saskatchewan Cancer Commission: Results of treatment of cancer in Saskatchewan, 1932–44, by T. A. Watson. Regina, King's Printer, 1951.

(*57*) Park, W. W., and Lees, J. C.: The absolute curability of cancer of the breast. Surg., Gynec., & Obst. 93: 129–152 (1951).

(*58*) Kraus, A. S.: A review of the effectiveness of early treatment in breast cancer. Surg., Gynec., & Obst. 96: 545–552 (1953).

(*59*) Shimkin, M. B., Lucia, E. L., Stone, R. S., and Bell, H. G.: Cancer of the breast. Surg., Gynec., & Obst. 94: 645–661 (1952).

(*60*) Dorn, H. F., and Horn, J. I.: The reliability of certificates of deaths from cancer. Am. J. Hyg. 34: 12–23 (1941).

(*61*) U. S. Bureau of the Census: Manual of the international list of causes of death (fifth revision) and Joint causes of death (fourth edition). Washington, D. C., U. S. Government Printing Office, 1940.

(*62*) World Health Organization: Manual of the international statistical classification of diseases, injuries, and causes of death. Sixth revision of the International lists of diseases and causes of death, adopted 1948. I. Introduction; II. Alphabetical index. Supp. 1. Bull. World Health Organization, 1948, 1949.

(*63*) Arestad, F. H., and McGovern, M. A.: Hospital service in the United States. J. A. M. A. 146: 109–123 (1951).

Appendix

SURVEY OF THE INCIDENCE OF CANCER

STATE OF IOWA 1950

IOWA STATE DEPARTMENT OF HEALTH
AND IOWA STATE MEDICAL SOCIETY
IN COOPERATION WITH
NATIONAL CANCER INSTITUTE

IF YOU HAD "NO CASES" CHECK (✓) THIS SQUARE [ ] AND RETURN

THIS INFORMATION IS CONFIDENTIAL AND WILL BE USED FOR STATISTICAL PURPOSES ONLY

INSTRUCTIONS: (Type or Print all Entries)

1. *Include every patient seen, treated or observed for any malignant neoplasm at any time during 1950.*
2. *Include every patient seen in 1950 and referred elsewhere for diagnosis or treatment.*
3. *Include every case hospitalized in 1950.*
4. *Enter all cases who died in 1950.*
5. *Include every patient treated before January 1950 who was seen only for check-up in 1950.*

FOR MORE SCHEDULES, SEND CARD TO:
Cancer Survey Office
Iowa State Department of Health
State Office Bldg.
Des Moines 19, Iowa
Phone 8-7111 Ext. 444

No. _____

PATIENT'S NAME AND HOME ADDRESS (Enter Last Name, First Name, Initial, and Mr., Mrs. or Miss. Indicate state for non-residents. Type or print. For married woman, enter husband's first name)	SEX M OR F	COLOR W OR NW	AGE JAN. 1, 1950	DATE FIRST SEEN WITH MALIGNANT NEOPLASM	DATE LAST TREATED FOR MALIGNANT NEOPLASM	DATE LAST SEEN INCLUDE CASES OBSERVED BUT NO LONGER TREATED	ALIVE ON JAN. 1, 1951	PRIMARY SITE (IF CANCER OF SKIN ENTER "SKIN OF ....."	TYPE OF MALIGNANT NEOPLASM (INCLUDE LEUKEMIAS, HODGKIN'S DISEASE AND OTHER LYMPHOMAS)	MICROSCOPIC CONFIRMATION	STAGE AT DIAGNOSIS: LOCALIZED	STAGE AT DIAGNOSIS: METASTASES REGIONAL	STAGE AT DIAGNOSIS: METASTASES REMOTE	DATE OF 1950 HOSPITALIZATION: DATE OF ADMISSION	DATE OF 1950 HOSPITALIZATION: DATE OF DISCHARGE
EXAMPLE. DOE MARY L. MRS. (John J.) 1776 POTTAWATTAMIE ST., DES MOINES, IOWA	F	W	57	APRIL 1949	DEC. 1950	FEB 1951	(YES) NO	CERVIX	SQUAMOUS CELL CARCINOMA	(YES) NO		X		MAY 20, 1950	MAY 30, 1950
1.							YES NO			YES NO					
2.							YES NO			YES NO					
3							YES NO			YES NO					
4							YES NO			YES NO					
5.							YES NO			YES NO					
6.							YES NO			YES NO					
7.							YES NO			YES NO					
8.							YES NO			YES NO					
9.							YES NO			YES NO					
10.							YES NO			YES NO					

SURVEY SCHEDULE I2/50 NCI

Appendix table 1. Population of Iowa, for urban and rural areas by age and sex, 1950

Age	Urban [1]		Rural		Age	Urban [1]		Rural	
	Male	Female	Male	Female		Male	Female	Male	Female
All ages	594, 866	634, 567	715, 417	676, 223	45–49	34, 700	37, 969	40, 925	38, 030
Under 5	63, 190	60, 201	80, 424	76, 454	50–54	33, 806	36, 966	39, 465	36, 966
5–9	47, 189	45, 723	68, 625	64, 837	55–59	32, 615	34, 735	37, 200	34, 497
10–14	40, 187	39, 536	61, 712	57, 790	60–64	27, 932	30, 444	32, 319	29, 548
15–19	38, 391	45, 485	53, 123	47, 169	65–69	22, 571	26, 580	26, 625	25, 033
20–24	49, 112	53, 444	44, 774	42, 458	70–74	16, 401	20, 001	20, 220	19, 018
25–29	48, 994	49, 237	47, 106	47, 506	75–79	10, 911	14, 107	13, 612	12, 825
30–34	42, 426	44, 701	47, 028	46, 811	80–84	6, 022	8, 171	7, 625	7, 648
35–39	39, 760	42, 447	47, 050	44, 922	85 and over	3, 048	4, 651	3, 671	4, 258
40–44	37, 611	40, 169	43, 913	40, 453					

[1] Old definition used by U. S. Bureau of the Census.

SOURCE: 1950 Census of Population.

Appendix table 2. Cancer incidence rates per 100,000 population, for urban and rural areas, by primary site, sex, and age

Primary site, sex, urban and rural areas	All ages, crude rate	Age									Age adjusted rate [1]
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over	
All sites	346. 7	14. 7	21. 7	64. 5	174. 8	451. 4	828. 0	1, 361. 9	2, 168. 8	2, 687. 5	300. 7
Male	339. 5	16. 6	18. 3	52. 3	116. 4	376. 1	804. 2	1, 472. 9	2, 533. 4	3, 348. 7	296. 4
Urban	401. 1	21. 9	24. 0	71. 1	144. 8	464. 2	995. 9	1, 703. 8	2, 799. 3	3, 149. 6	350. 6
Rural	288. 4	12. 8	13. 3	34. 0	92. 3	301. 0	637. 2	1, 280. 8	2, 321. 4	3, 514. 0	250. 2
Female	353. 9	12. 8	24. 9	76. 5	233. 3	526. 2	852. 0	1, 256. 7	1, 843. 2	2, 188. 8	306. 7
Urban	422. 0	18. 6	31. 3	90. 5	302. 6	615. 2	954. 3	1, 341. 7	2, 127. 7	2, 214. 6	351. 6
Rural	290. 0	8. 5	17. 9	62. 6	166. 3	437. 4	747. 9	1, 166. 8	1, 533. 7	2, 160. 6	261. 5
Buccal cavity and pharynx	*18. 7*	*. 3*	*1. 9*	*5. 6*	*10. 7*	*26. 4*	*42. 0*	*74 8*	*105. 0*	*121. 6*	*16. 4*
Male	31. 1	. 3	3. 2	8. 1	18. 4	39. 0	72. 3	127. 0	199. 1	267. 9	27. 8
Urban	36. 5	. 7	4. 6	12. 0	14. 2	43. 8	77. 6	156. 5	265. 8	229. 7	32. 1
Rural	26. 7	0	2. 1	4. 2	21. 9	34. 8	67. 6	102. 5	146. 0	229. 6	24. 1
Female	6. 3	. 3	. 5	3. 2	3. 0	14. 0	11. 6	25. 4	21. 1	11. 2	5. 6
Urban	8. 4	. 7	1. 0	4. 3	3. 6	18. 7	9. 2	34. 3	31. 4	21. 5	7. 2
Rural	4. 3	0	0	2. 1	2. 3	9. 3	14. 1	15. 9	9. 8	0	4. 1
Lip	*9. 6*	*0*	*0*	*1. 9*	*5. 9*	*16. 4*	*23. 1*	*36. 8*	*55. 6*	*57. 6*	*8. 6*
Male	18. 4	0	0	3. 8	11. 8	28. 2	45. 4	72. 2	107. 3	133. 9	16. 4
Urban	19. 7	0	0	7. 6	6. 4	27. 7	37. 9	94. 9	135. 9	98. 4	17. 3
Rural	17. 2	0	0	0	16. 4	28. 6	51. 7	53. 4	84. 8	163. 4	15. 7
Female	1. 1	0	0	0	0	4. 8	. 8	3. 3	9. 4	0	1. 0
Urban	1. 4	0	0	0	0	5. 3	0	6. 4	9. 0	0	1. 2
Rural	. 9	0	0	0	0	4. 0	1. 6	0	. 8	0	. 8
Tongue	*1. 2*	*0*	*0*	*0*	*0*	*3. 4*	*2. 7*	*5. 1*	*4. 9*	*6. 4*	*1. 0*
Male	1. 5	0	0	0	0	3. 4	3. 1	8. 2	7. 9	14. 9	1. 4
Urban	1. 8	0	0	0	0	4. 4	3. 3	10. 3	11. 8	0	1. 6
Rural	1. 3	0	0	0	0	2. 5	2. 9	6. 4	4. 7	27. 2	1. 1
Female	. 8	0	0	0	0	3. 3	2. 2	2. 2	2. 3	0	. 7
Urban	. 9	0	0	0	0	5. 3	0	2. 1	4. 5	0	. 8
Rural	. 7	0	0	0	0	1. 3	4. 7	2. 3	0	0	. 7
Salivary glands	*2. 6*	*0*	*. 5*	*2. 9*	*1. 8*	*2. 3*	*3. 5*	*9. 6*	*16. 1*	*12. 8*	*2. 3*
Male	2. 7	0	. 5	2. 7	1. 8	1. 3	3. 1	10. 5	26. 2	29. 8	2. 4
Urban	3. 4	0	0	1. 1	1. 3	2. 9	5. 0	15. 4	35. 4	32. 8	2. 9
Rural	2. 2	0	1. 1	4. 2	2. 2	0	1. 4	6. 4	18. 8	27. 2	2. 1
Female	2. 4	0	. 5	3. 2	1. 8	3. 3	3. 9	8. 9	7. 1	0	2. 2
Urban	3. 2	0	1. 0	4. 3	1. 2	4. 1	4. 6	10. 7	13. 4	0	2. 7
Rural	1. 7	0	0	2. 1	2. 3	2. 7	3. 1	6. 8	0	0	1. 6
Mouth, other	*3. 4*	*. 3*	*1. 1*	*. 5*	*1. 8*	*2. 3*	*7. 7*	*15. 9*	*17. 3*	*32. 0*	*2. 9*
Male	5. 4	. 3	2. 2	1. 1	2. 4	3. 4	11. 5	25. 6	36. 7	59. 5	4. 8
Urban	6. 7	. 7	3. 5	2. 2	2. 6	4. 4	18. 2	28. 2	35. 4	32. 8	6. 0
Rural	4. 3	0	1. 0	0	2. 2	2. 5	5. 8	23. 5	37. 7	81. 8	3. 7
Female	1. 4	. 3	0	0	1. 2	1. 3	3. 9	6. 6	0	11. 2	1. 2
Urban	2. 4	. 7	0	0	2. 4	2. 7	4. 6	13. 0	0	21. 5	2. 1
Rural	. 3	0	0	0	0	0	3. 1	0	0	0	. 3
Pharynx	*1. 9*	*0*	*. 3*	*. 3*	*1. 2*	*2. 0*	*5. 0*	*7. 4*	*11. 1*	*12. 8*	*1. 6*
Male	3. 1	0	. 5	. 5	2. 4	2. 7	9. 2	10. 5	21. 0	29. 8	2. 8
Urban	4. 9	0	1. 1	1. 1	3. 9	4. 4	13. 2	7. 7	47. 3	65. 7	4. 3
Rural	1. 7	0	0	0	1. 1	1. 2	5. 8	12. 8	0	0	1. 5
Female	. 6	0	0	0	0	1. 3	. 8	4. 4	2. 3	0	. 5
Urban	. 5	0	0	0	0	1. 3	0	2. 1	4. 5	0	. 4
Rural	. 7	0	0	0	0	1. 3	1. 6	6. 8	0	0	. 7
Digestive system	*87. 2*	*. 4*	*1. 6*	*5. 9*	*22. 9*	*67. 9*	*189. 0*	*407. 0*	*771. 2*	*902. 1*	*71. 9*
Male	90. 8	. 6	1. 6	4. 9	25. 5	71. 2	207. 6	440. 4	820. 1	967. 4	77. 4
Urban	102. 0	. 7	1. 1	5. 5	38. 9	84. 7	272. 5	459. 3	826. 8	885. 8	87. 6
Rural	81. 4	. 5	2. 0	4. 3	14. 3	59. 7	151. 0	424. 7	814. 6	1, 035. 2	68. 7
Female	83. 4	. 3	1. 6	6. 9	20. 2	64. 7	170. 2	375. 2	727. 4	853. 2	66. 8
Urban	89. 4	. 7	2. 0	8. 5	21. 8	84. 1	174. 9	352. 2	749. 6	645. 1	68. 5
Rural	78. 2	0	1. 1	5. 3	18. 7	45. 3	165. 5	399. 4	703. 3	1, 080. 2	65. 2

See footnotes at end of table.

Appendix table 2. Cancer incidence rates per 100,000 population, for urban and rural areas, by primary site, sex, and age—Continued

Primary site, sex, urban and rural areas	All ages, crude rate	Age									Age adjusted rate [1]
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over	
Digestive system—Con.											
Esophagus	*2.3*	*0*	*0*	*0*	*.3*	*1.7*	*5.0*	*13.0*	*19.8*	*19.2*	*1.9*
Male	3.4	0	0	0	.6	3.4	9.2	18.6	23.6	29.8	3.0
Urban	4.5	0	0	0	1.3	4.4	14.9	20.5	23.6	65.6	3.9
Rural	2.5	0	0	0	0	2.5	4.3	17.1	23.5	0	2.1
Female	1.2	0	0	0	0	0	.8	7.7	16.4	11.2	.9
Urban	.9	0	0	0	0	0	0	6.4	9.0	21.5	.6
Rural	1.5	0	0	0	0	0	1.6	9.1	24.4	0	1.2
Stomach	*23.9*	*0*	*0*	*.3*	*2.4*	*14.4*	*39.3*	*107.8*	*289.2*	*307.1*	*19.0*
Male	29.9	0	0	0	1.8	15.4	59.3	151.5	351.1	357.3	24.7
Urban	29.7	0	0	0	2.6	16.1	69.3	148.8	336.7	196.9	24.7
Rural	30.0	0	0	0	1.1	14.9	50.4	153.6	362.7	490.4	24.7
Female	17.9	0	0	.5	3.0	13.3	19.3	66.2	233.9	269.4	13.6
Urban	17.8	0	0	1.1	4.8	17.3	18.4	64.4	197.5	193.5	13.1
Rural	18.0	0	0	0	1.2	9.3	20.3	68.1	273.4	352.2	14.1
Small intestine	*1.2*	*.3*	*.3*	*0*	*.6*	*1.7*	*3.1*	*2.8*	*7.4*	*12.8*	*1.0*
Male	1.5	.6	0	0	1.2	2.7	3.8	2.3	7.9	14.9	1.3
Urban	1.7	.7	0	0	1.3	2.9	5.0	2.6	11.8	0	1.5
Rural	1.3	.5	0	0	1.1	2.5	2.9	2.1	4.7	27.2	1.2
Female	.9	0	.5	0	0	.7	2.3	3.3	7.0	11.2	.7
Urban	1.3	0	0	0	0	1.3	3.1	4.3	13.5	0	1.0
Rural	.6	0	1.1	0	0	0	1.6	2.3	0	23.5	.5
Large intestine	*28.1*	*0*	*.8*	*3.4*	*10.4*	*22.0*	*62.9*	*129.3*	*223.7*	*313.4*	*23.5*
Male	24.5	0	.5	3.3	10.0	14.8	58.4	116.5	204.3	312.5	21.0
Urban	29.4	0	0	3.3	15.6	16.1	80.8	130.9	242.1	262.5	25.4
Rural	20.3	0	1.0	3.2	5.5	13.7	38.8	104.6	174.2	354.1	17.4
Female	31.8	0	1.1	3.8	10.6	29.4	67.4	141.3	240.9	314.4	25.9
Urban	36.7	0	2.0	5.3	12.2	34.8	67.5	148.2	278.2	322.6	28.3
Rural	27.3	0	0	2.1	9.3	24.0	67.0	133.8	200.3	305.2	23.3
Rectum	*14.3*	*0*	*.5*	*1.6*	*6.2*	*15.3*	*34.7*	*72.5*	*85.3*	*83.2*	*12.3*
Male	16.1	0	1.1	1.1	8.3	20.1	37.7	79.2	96.9	133.9	14.2
Urban	18.4	0	1.1	2.2	12.9	24.8	44.6	79.5	94.5	164.0	16.3
Rural	14.3	0	1.0	0	4.4	16.2	31.6	78.9	98.9	109.0	12.4
Female	12.5	0	0	2.1	4.2	10.7	31.7	66.2	74.9	44.9	10.5
Urban	12.3	0	0	2.1	3.6	14.7	35.3	47.3	76.3	0	10.0
Rural	12.7	0	0	2.1	4.7	6.7	28.1	86.2	73.3	93.9	11.0
Liver	*5.0*	*.1*	*0*	*0*	*1.2*	*2.0*	*7.3*	*25.5*	*48.2*	*102.4*	*3.9*
Male	4.2	0	0	0	.6	2.7	7.7	23.3	39.3	74.4	3.5
Urban	4.5	0	0	0	1.3	2.9	14.9	18.0	29.5	98.4	3.9
Rural	3.9	0	0	0	0	2.5	1.4	27.8	47.1	54.5	3.2
Female	5.7	.3	0	0	1.8	1.3	7.0	27.6	56.1	123.5	4.3
Urban	5.0	.7	0	0	1.2	1.3	4.6	25.8	49.4	64.5	3.7
Rural	6.4	0	0	0	2.3	1.3	9.4	29.5	63.5	187.9	5.1
Gall bladder and biliary passages	*3.3*	*0*	*0*	*.3*	*.6*	*1.7*	*8.5*	*18.7*	*27.2*	*6.4*	*2.7*
Male	1.8	0	0	0	1.2	0	3.1	11.7	21.0	0	1.6
Urban	1.7	0	0	0	0	0	3.3	12.8	17.7	0	1.4
Rural	2.0	0	0	0	2.2	0	2.9	10.7	23.5	0	1.7
Female	4.7	0	0	.5	0	3.3	13.9	25.4	32.7	11.2	3.9
Urban	5.4	0	0	0	0	6.7	13.8	21.5	44.9	0	4.2
Rural	4.1	0	0	1.1	0	0	14.1	29.5	19.5	23.5	3.6
Pancreas	*7.2*	*0*	*0*	*.3*	*.6*	*6.4*	*24.3*	*28.9*	*56.8*	*38.4*	*6.0*
Male	8.0	0	0	.5	1.2	9.4	26.1	31.5	62.9	44.6	6.9
Urban	10.4	0	0	0	2.6	13.1	38.0	38.5	59.1	98.4	9.0
Rural	6.0	0	0	1.1	0	6.2	15.8	25.6	65.9	0	5.1
Female	6.3	0	0	0	0	3.3	22.4	26.5	51.5	33.7	5.1
Urban	7.6	0	0	0	0	4.0	24.5	27.9	67.3	21.5	5.7
Rural	5.2	0	0	0	0	2.7	20.3	25.0	34.2	47.0	4.4

See footnotes at end of table.

Appendix table 2. Cancer incidence rates per 100,000 population, for urban and rural areas, by primary site, sex, and age—Continued

Primary site, sex, urban and rural areas	All ages, crude rate	Age								Age adjusted rate [1]
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over	
Other digestive	*1.9*	*0*	*0*	*0*	*.6*	*2.7*	*3.9*	*8.5*	*13.6*	*19.2*	*1.6*
Male	1.4	0	0	0	.6	2.7	2.3	5.8	13.1	0	1.2
Urban	1.7	0	0	0	1.3	4.4	1.7	7.7	11.8	0	1.5
Rural	1.1	0	0	0	0	1.2	2.9	4.3	14.1	0	.9
Female	2.4	0	0	0	.6	2.7	5.4	11.0	14.0	33.7	1.9
Urban	2.4	0	0	0	0	4.0	7.7	6.4	13.5	21.5	1.9
Rural	2.4	0	0	0	1.2	1.3	3.1	15.9	14.7	47.0	2.0
Respiratory system	*16.7*	*.6*	*0*	*.8*	*4.5*	*25.1*	*62.5*	*62.9*	*70.4*	*64.0*	*14.6*
Male	24.2	.3	0	1.6	7.1	39.6	98.4	81.6	102.2	74.4	21.6
Urban	37.0	0	0	3.3	9.0	62.8	147.0	138.6	118.1	131.2	32.8
Rural	13.6	.5	0	0	5.5	19.9	56.1	34.2	89.5	27.2	12.1
Female	9.2	.9	0	0	1.8	10.7	26.3	45.2	42.1	56.1	7.7
Urban	11.2	1.4	0	0	3.6	13.3	27.6	49.4	58.4	43.0	9.0
Rural	7.2	.5	0	0	0	8.0	25.0	40.9	24.4	70.5	6.3
Larynx	*1.4*	*0*	*0*	*0*	*.9*	*2.7*	*6.6*	*2.8*	*4.9*	*0*	*1.3*
Male	2.3	0	0	0	1.8	4.7	10.8	3.5	7.9	0	2.1
Urban	3.2	0	0	0	1.3	5.8	19.8	5.1	0	0	2.9
Rural	1.5	0	0	0	2.2	3.7	2.9	2.1	14.1	0	1.4
Female	.5	0	0	0	0	.7	2.3	2.2	2.3	0	.5
Urban	1.1	0	0	0	0	1.3	4.6	4.3	4.5	0	.9
Rural	0	0	0	0	0	0	0	0	0	0	0
Lung and bronchus	*14.5*	*.4*	*0*	*.8*	*3.6*	*21.7*	*54.0*	*56.1*	*59.3*	*57.6*	*12.6*
Male	21.1	0	0	1.6	5.3	34.2	86.8	73.4	86.4	74.4	18.8
Urban	32.8	0	0	3.3	7.7	55.5	125.5	128.4	106.3	131.2	29.0
Rural	11.5	0	0	0	3.3	16.2	53.2	27.8	70.7	27.2	10.2
Female	7.9	.9	0	0	1.8	9.3	20.9	39.7	35.1	44.9	6.6
Urban	9.6	1.4	0	0	3.6	12.0	21.5	43.0	49.4	43.0	7.8
Rural	6.0	.5	0	0	0	6.7	20.3	36.4	19.5	47.0	5.3
Other respiratory	*.8*	*.2*	*0*	*0*	*0*	*.7*	*1.9*	*4.0*	*6.2*	*6 4*	*.7*
Male	.8	.3	0	0	0	.7	.8	4.7	7.9	0	.7
Urban	1.0	0	0	0	0	1.5	1.7	5.1	11.8	0	.9
Rural	.6	.5	0	0	0	0	0	4.3	4.7	0	.5
Female	.8	0	0	0	0	.7	3.1	3.3	4.7	11.2	.6
Urban	.5	0	0	0	0	0	1.5	2.1	4.5	0	.3
Rural	1.2	0	0	0	0	1.3	4.7	4.5	4.9	23.5	1.0
Breast	*39.9*	*0*	*1.6*	*8.8*	*33.8*	*80.3*	*98.3*	*131.6*	*171.8*	*179.2*	*36.1*
Male	1.1	0	0	0	.6	2.0	3.1	8.2	0	0	1.0
Urban	1.7	0	0	0	0	2.9	6.6	10.3	0	0	1.5
Rural	.7	0	0	0	1.1	1.2	0	6.4	0	0	.7
Female	78.7	0	3.2	17.5	67.2	158.1	194.3	248.3	325.1	314.3	70.3
Urban	91.4	0	6.1	16.0	76.3	178.8	219.4	255.5	386.0	301.0	78.0
Rural	66.8	0	0	19.1	58.6	137.4	168.6	240.6	258.9	328.8	62.4
Female genital organs [2]	*80.7*	*.9*	*4.7*	*27.7*	*90.4*	*164.0*	*222.2*	*207.4*	*236.3*	*224.5*	*74.2*
Urban	100.2	1.4	5.1	35.0	125.9	181.6	251.7	229.7	323.2	279.5	88.7
Rural	62.4	.5	4.6	20.1	56.2	146.8	192.2	183.9	141.6	164.4	59.8
Cervix uteri [2]	*35.0*	*0*	*1.1*	*21.8*	*60.0*	*77.3*	*75.9*	*67.2*	*79.6*	*78.6*	*33.4*
Urban	47.1	0	2.1	29.7	88.3	92.2	87.5	77.3	125.7	129.0	43.4
Rural	23.7	0	0	13.7	32.8	62.8	64.0	56.7	29.3	23.5	23.6
Corpus uteri [2]	*12.1*	*0*	*0*	*1.1*	*6.0*	*32.7*	*35.6*	*40.8*	*32.7*	*11.2*	*11.0*
Urban	12.9	0	0	1.1	7.3	28.0	33.8	45.1	44.9	21.5	11.0
Rural	11.4	0	0	1.1	4.7	37.3	37.5	36.3	19.5	0	10.9
Uterus, other and unspecified [2]	*13.4*	*0*	*1.6*	*1.6*	*7.1*	*22.0*	*47.2*	*30.9*	*70.2*	*56.1*	*11.7*
Urban	16.5	0	2.0	1.1	7.3	29.4	59.8	36.5	76.3	21.5	14.0
Rural	10.4	0	1.2	2.1	7.0	14.7	34.4	25.0	63.4	93.9	9.4

See footnotes at end of table.

Appendix table 2. Cancer incidence rates per 100,000 population, for urban and rural areas, by primary site, sex, and age—Continued

Primary site, sex, urban and rural areas	All ages, crude rate	Age								Age adjusted rate [1]
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over	
Female genital organs—Continued											
Ovary [2]	*15.0*	*.6*	*2.0*	*2.1*	*13.1*	*28.0*	*47.2*	*51.9*	*25.7*	*33.7*	*13.6*
Urban	17.2	1.4	1.0	1.1	18.2	26.7	52.2	55.8	35.9	43.0	15.1
Rural	12.9	0	3.4	3.2	8.2	29.3	42.2	47.7	14.7	23.5	12.3
Other female genital organs [2]	*5.2*	*.3*	*0*	*1.1*	*4.2*	*4.0*	*16.3*	*16.6*	*28.1*	*44.9*	*4.5*
Urban	6.5	0	0	2.0	4.8	5.3	18.4	15.0	40.4	64.5	5.2
Rural	4.0	.5	0	0	3.5	2.7	14.1	18.2	14.7	23.5	3.6
Male genital organs [3]	*49.4*	*0*	*2.2*	*6.5*	*10.7*	*18.8*	*73.0*	*237.7*	*620.9*	*729.3*	*41.0*
Urban	51.9	0	3.4	6.6	12.9	29.2	72.7	233.5	702.8	524.9	43.5
Rural	47.2	0	1.0	6.4	8.8	10.0	73.4	241.1	555.6	899.0	39.0
Prostate [3]	*44.1*	*0*	*0*	*0*	*.6*	*11.4*	*64.5*	*231.9*	*597.3*	*729.3*	*35.8*
Urban	46.0	0	0	0	0	23.4	66.1	223.2	679.2	524.9	37.8
Rural	42.4	0	0	0	1.1	1.2	63.3	239.0	532.1	899.0	34.2
Other male genital organs [3]	*5.3*	*0*	*2.2*	*6.5*	*10.1*	*7.4*	*8.5*	*5.8*	*23.6*	*0*	*5.2*
Urban	5.9	0	3.4	6.6	12.9	5.8	6.6	10.3	23.6	0	5.7
Rural	4.8	0	1.0	6.4	7.7	8.8	10.1	2.1	23.5	0	4.8
Urinary organs	*16.7*	*1.6*	*.8*	*1.6*	*2.4*	*19.4*	*42.0*	*79.9*	*101.3*	*134.4*	*14.3*
Male	23.4	1.4	.5	2.2	3.0	28.9	62.3	114.2	141.5	238.1	20.4
Urban	28.7	2.6	1.1	2.2	5.2	40.9	71.0	128.3	177.2	295.3	25.1
Rural	19.0	.5	0	2.1	1.1	18.7	54.7	102.5	113.0	190.7	16.5
Female	10.1	1.6	1.1	1.1	1.8	10.0	21.7	47.4	65.5	56.1	8.4
Urban	13.4	2.7	1.0	1.1	2.4	12.0	32.2	49.4	85.3	107.5	10.6
Rural	7.0	1.0	1.1	1.1	1.2	8.0	10.9	45.4	44.0	0	6.1
Kidney	*3.9*	*1.6*	*.5*	*1.1*	*.3*	*4.4*	*11.2*	*19.8*	*8.7*	*6.4*	*3.5*
Male	4.5	1.4	0	1.7	.6	4.7	12.3	25.6	13.1	0	4.1
Urban	5.4	2.6	0	1.1	1.3	2.9	14.9	33.4	11.8	0	4.8
Rural	3.8	.5	0	2.1	0	6.3	10.1	19.2	14.1	0	3.5
Female	3.4	1.6	1.1	.6	0	4.0	10.1	14.3	4.7	11.2	3.0
Urban	3.6	2.7	1.0	1.1	0	2.7	15.3	8.6	0	21.5	3.3
Rural	3.1	1.0	1.1	0	0	5.4	4.7	20.4	9.8	0	2.8
Bladder	*12.5*	*0*	*.3*	*.5*	*2.1*	*14.3*	*29.6*	*59.5*	*91.4*	*121.6*	*10.5*
Male	18.7	0	.5	.5	2.4	24.2	50.0	87.4	128.4	223.2	16.2
Urban	23.1	0	1.1	1.1	3.9	38.0	56.1	94.9	165.4	262.5	20.2
Rural	15.1	0	0	0	1.1	12.4	44.6	81.2	98.9	190.7	12.9
Female	6.2	0	0	.5	1.8	4.7	9.3	33.1	58.5	44.9	5.0
Urban	9.0	0	0	0	2.4	8.0	12.3	40.8	80.8	86.0	6.6
Rural	3.8	0	0	1.1	1.2	1.3	6.2	25.0	34.2	0	3.2
Other urinary	*.3*	*0*	*0*	*0*	*0*	*.7*	*1.2*	*.6*	*1.2*	*6.4*	*.3*
ale	.2	0	0	0	0	0	0	1.2	0	14.9	.1
M Urban	.2	0	0	0	0	0	0	0	0	32.8	.1
Rural	.1	0	0	0	0	0	0	2.1	0	0	.1
Female	.5	0	0	0	0	1.3	2.3	0	2.3	0	.4
Urban	.8	0	0	0	0	1.3	4.6	0	4.5	0	.7
Rural	.1	0	0	0	0	1.3	0	0	0	0	.1
Skin	*55.8*	*.6*	*2.9*	*8.6*	*25.9*	*71.9*	*125.0*	*241.4*	*346.0*	*537.5*	*48.0*
Male	69.7	.3	3.7	9.6	23.8	100.8	162.9	308.7	450.6	714.4	61.4
Urban	82.5	.7	7.0	12.0	25.9	112.3	198.2	364.4	549.2	689.0	72.1
Rural	59.0	0	1.0	7.4	22.0	90.8	132.3	262.6	372.0	735.5	52.1
Female	42.0	.9	2.1	7.4	27.9	43.4	86.7	177.6	252.6	404.1	35.3
Urban	56.1	1.4	3.0	10.6	41.2	57.4	105.9	234.0	291.8	451.5	45.4
Rural	28.7	.5	1.1	4.2	15.2	29.3	67.1	118.0	210.0	352.3	24.9

See footnotes at end of table.

Appendix table 2. Cancer incidence rates per 100,000 population, for urban and rural areas, by primary site, sex, and age—Continued

Primary site, sex, urban and rural areas	All ages, crude rate	Age								Age adjusted rate [1]
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over	
Eye	.6	.3	0	0	0	1.3	1.2	2.8	1.2	6.4	.5
Male	.8	.6	0	0	0	2.0	.8	3.5	2.6	14.9	.8
Urban	.5	.7	0	0	0	1.5	0	2.6	0	0	.5
Rural	1.1	.5	0	0	0	2.5	1.4	4.3	4.7	27.2	1.0
Female	.4	0	0	0	0	.7	1.5	2.2	0	0	.3
Urban	.6	0	0	0	0	1.3	3.1	2.1	0	0	.5
Rural	.1	0	0	0	0	0	0	2.3	0	0	.1
Brain and nervous system	4.7	1.7	2.9	1.6	4.2	9.4	14.3	8.5	0	0	4.6
Male	6.2	2.2	2.7	2.2	6.5	13.4	17.7	11.7	0	0	6.0
Urban	8.2	3.2	1.1	2.2	11.6	14.6	21.5	23.1	0	0	7.9
Rural	4.5	1.4	4.2	2.1	2.2	12.4	14.4	2.1	0	0	4.5
Female	3.3	1.5	3.2	1.1	1.8	5.3	10.8	5.5	0	0	3.2
Urban	3.9	2.1	5.1	1.1	2.4	4.0	10.7	8.6	0	0	3.7
Rural	2.7	1.0	1.1	1.1	1.2	6.7	10.9	2.3	0	0	2.6
Brain	4.2	1.6	2.9	1.6	3.9	7.7	12.0	8.5	0	0	4.1
Male	5.7	2.2	2.7	2.2	5.9	12.1	15.4	11.7	0	0	5.6
Urban	7.7	3.2	1.1	2.2	10.3	14.6	18.2	23.1	0	0	7.4
Rural	4.1	1.4	4.2	2.1	2.2	9.9	13.0	2.1	0	0	4.1
Female	2.8	1.2	3.2	1.1	1.8	3.3	8.5	5.5	0	0	2.7
Urban	3.1	2.1	5.1	1.1	2.4	1.3	6.1	8.6	0	0	3.0
Rural	2.4	.5	1.1	1.1	1.2	5.4	10.9	2.3	0	0	2.3
Other nervous system	.5	.1	0	0	.3	1.7	2.3	0	0	0	.5
Male	.5	0	0	0	.6	1.3	2.3	0	0	0	.4
Urban	.5	0	0	0	1.3	0	3.3	0	0	0	.5
Rural	.4	0	0	0	0	2.5	1.4	0	0	0	.4
Female	.5	.3	0	0	0	2.0	2.3	0	0	0	.5
Urban	.8	0	0	0	0	2.7	4.6	0	0	0	.7
Rural	.3	.5	0	0	0	1.3	0	0	0	0	.3
Endocrine glands [4]	2.5	.3	1.1	2.7	.6	4.0	7.7	6.2	4.9	6.4	2.4
Male	1.9	.3	0	1.1	.6	4.6	6.9	4.7	5.2	0	1.8
Urban	2.4	.7	0	1.1	1.3	5.8	8.3	5.1	0	0	2.2
Rural	1.5	0	0	1.1	0	2.5	5.8	4.3	9.4	0	1.4
Female	3.1	.3	2.1	4.2	.6	4.0	8.5	7.7	4.7	11.2	2.9
Urban	3.8	0	1.0	5.3	1.2	8.0	9.2	10.7	0	0	3.5
Rural	2.5	.5	3.4	3.2	0	0	7.8	4.5	9.8	23.5	2.4
Thyroid	2.2	.2	.8	2.4	.6	3.0	6.9	5.6	4.9	6.4	2.1
Male	1.5	.3	0	1.1	.6	2.7	5.4	3.5	5.2	0	1.4
Urban	2.2	.7	0	1.1	1.3	4.3	8.3	5.1	0	0	2.0
Rural	.9	0	0	1.1	0	1.3	2.9	2.1	9.4	0	.9
Female	2.8	0	1.6	3.7	.6	3.3	8.5	7.7	4.7	11.2	2.6
Urban	3.5	0	1.0	4.2	1.2	6.7	9.2	10.7	0	0	3.2
Rural	2.2	0	2.3	3.2	0	0	7.8	4.5	9.8	23.5	2.1

See footnotes at end of table.

Appendix table 2. Cancer incidence rates per 100,000 population, for urban and rural areas, by primary site, sex, and age—Continued

Primary site, sex, urban and rural areas	All ages, crude rate	Age								Age adjusted rate [1]
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over	
Endocrine glands [4]—Con.											
Other endocrines	.3	.1	.3	.3	0	1.0	.8	.6	0	0	.3
Male	.4	0	0	0	0	1.3	1.5	1.2	0	0	.4
Urban	.2	0	0	0	0	1.5	0	0	0	0	.2
Rural	.6	0	0	0	0	1.2	2.9	2.2	0	0	.5
Female	.3	.3	.5	.5	0	.7	0	0	0	0	.3
Urban	.3	0	0	1.1	0	1.3	0	0	0	0	.3
Rural	.3	.5	1.1	0	0	0	0	0	0	0	.3
Bone	2.2	.6	.5	1.3	2.4	1.7	2.7	7.4	16.1	6.4	2.0
Male	2.7	.8	1.1	1.6	1.8	2.0	.8	10.5	31.4	0	2.5
Urban	2.9	1.3	1.1	3.3	1.3	2.9	0	12.8	17.7	0	2.6
Rural	2.7	.5	1.0	0	2.2	1.2	1.4	8.5	42.4	0	2.3
Female	1.7	.3	0	1.1	3.0	1.3	4.6	4.4	2.3	11.2	1.6
Urban	1.7	0	0	1.1	3.6	1.3	6.1	0	4.5	21.5	1.6
Rural	1.6	.5	0	1.1	2.3	1.3	3.1	9.1	0	0	1.6
Soft tissue	2.1	.7	.3	.8	2.4	4.4	4.6	3.4	6.2	12.8	2.0
Male	2.3	.8	0	1.6	1.8	4.7	3.8	5.8	5.2	29.8	2.2
Urban	3.0	.7	0	2.2	1.3	7.3	3.3	12.8	5.9	32.8	2.8
Rural	1.7	.9	0	1.1	2.2	2.5	4.3	0	4.7	27.2	1.6
Female	1.9	.6	.5	0	3.0	4.0	5.4	1.1	7.0	0	1.8
Urban	1.6	.7	1.0	0	1.2	1.3	4.6	2.1	9.0	0	1.4
Rural	2.2	.5	0	0	4.7	6.7	6.2	0	4.9	0	2.2
Lymphatic tissue	8.2	.7	2.4	6.4	5.6	14.7	20.1	23.2	21.0	19.2	7.6
Male	9.5	1.1	2.2	9.2	6.5	16.1	26.9	19.8	26.2	29.8	9.0
Urban	12.9	.7	4.6	14.1	10.3	20.4	36.3	28.2	17.7	32.8	12.2
Rural	6.6	1.4	0	4.2	3.3	12.4	18.7	12.8	33.0	27.2	6.1
Female	6.9	.3	2.7	3.7	4.8	13.3	13.2	26.5	16.4	11.2	6.3
Urban	8.0	.7	2.0	3.2	8.5	18.7	13.8	19.3	22.4	21.5	7.2
Rural	5.8	0	3.3	4.2	1.2	8.0	12.5	34.1	9.8	0	5.5
Hematopoietic system	12.0	5.9	1.9	2.7	6.5	15.4	29.3	36.8	50.7	38.4	10.9
Male	13.8	7.1	1.1	3.2	9.5	20.8	30.0	40.8	60.3	44.6	12.7
Urban	15.3	9.9	0	5.5	11.6	23.4	31.4	48.8	41.3	32.8	14.4
Rural	12.6	5.2	2.0	1.1	7.7	18.7	28.8	34.2	75.3	54.5	11.4
Female	10.2	4.6	2.7	2.1	3.6	10.0	28.6	33.1	42.1	33.7	9.0
Urban	12.8	6.1	3.0	4.3	3.6	10.7	30.7	42.9	53.9	43.0	10.9
Rural	7.8	3.5	2.2	0	3.5	9.3	26.5	22.7	29.3	23.5	7.2
Ill-defined sites	14.3	.6	.3	.5	2.4	17.7	42.0	53.8	85.3	217.6	12.1
Male	12.6	.8	0	.5	.6	12.8	37.7	58.3	68.1	238.1	10.8
Urban	15.6	0	0	1.1	1.3	11.7	49.5	79.5	76.8	295.3	13.3
Rural	10.1	1.4	0	0	0	13.7	27.3	40.6	61.2	190.7	8.7
Female	16.0	.3	.5	.5	4.2	22.7	46.4	49.7	100.6	202.0	13.3
Urban	19.5	.7	1.0	0	7.3	24.0	55.2	51.5	112.2	279.5	15.4
Rural	12.7	0	0	1.1	1.2	21.3	37.5	47.7	87.9	117.4	11.1

[1] Adjusted on age distribution of the total population of the continental United States, 1950.
[2] Rates per 100,000 females.
[3] Rates per 100,000 males.
[4] Not elsewhere classified.

Appendix table 3. Number of newly diagnosed resident cases of cancer in Iowa with microscopic confirmation of diagnosis per 100,000 population for urban and rural areas, by primary site, sex, and age

Primary site, sex, urban and rural areas	All ages, crude rate	Age (years)							Age adjusted rate [1]
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75 and over	
All sites:										
Male	217.8	12.5	14.0	43.1	93.3	281.4	590.5	949.7	1,211.9	194.0
Urban	269.0	16.6	19.4	55.8	121.5	356.2	739.9	1,129.0	1,406.3	238.7
Rural	175.3	9.5	9.2	30.8	69.3	217.7	460.3	800.5	1,055.9	156.0
Female	254.6	10.2	21.7	70.1	210.1	455.5	670.2	868.3	851.7	228.7
Urban	310.1	14.4	27.3	86.2	268.7	531.1	742.6	953.2	1,080.6	267.2
Rural	202.4	7.0	15.6	54.1	153.4	380.0	596.5	778.6	602.5	189.8
Buccal cavity and pharynx:										
Male	22.5	.3	3.3	5.9	14.9	30.9	53.0	96.7	120.4	20.3
Urban	26.6	.7	4.6	7.7	12.9	35.0	59.5	120.6	145.1	23.6
Rural	19.1	0	2.1	4.2	16.5	27.4	47.5	76.9	100.4	17.6
Female	5.4	.3	.5	3.2	3.0	10.0	11.6	22.1	17.4	5.0
Urban	7.2	.7	1.0	4.3	3.6	12.0	9.2	30.1	29.7	6.2
Rural	3.8	0	0	2.1	2.3	8.0	14.1	13.6	4.0	3.7
Lip:										
Male	12.3	0	0	2.2	8.9	20.8	31.4	52.4	55.7	11.1
Urban	13.2	0	0	4.4	5.1	20.4	24.8	74.4	60.1	11.6
Rural	11.6	0	0	0	12.1	21.2	37.4	34.2	52.3	10.7
Female	.9	0	0	0	0	3.3	.8	3.3	5.8	.8
Urban	1.3	0	0	0	0	4.0	0	6.4	7.4	1.0
Rural	.6	0	0	0	0	2.7	1.6	0	4.0	.6
Digestive system:										
Male	51.5	.6	1.6	4.3	22.0	56.5	157.6	247.1	274.0	45.3
Urban	61.8	.7	1.1	4.4	34.8	68.6	204.8	279.6	275.3	54.6
Rural	42.8	.5	2.1	4.2	11.0	46.0	116.5	219.9	273.0	37.5
Female	47.1	.3	1.6	6.4	17.3	54.7	123.0	238.3	220.7	40.0
Urban	51.8	.7	2.0	7.5	16.9	73.4	127.4	227.6	226.5	42.3
Rural	42.4	0	1.1	5.3	17.6	36.0	118.7	249.7	214.3	37.5
Stomach:										
Male	12.8	0	0	0	1.2	10.1	37.7	67.5	98.1	10.9
Urban	14.5	0	0	0	1.3	11.7	41.2	82.1	100.2	12.3
Rural	11.5	0	0	0	1.1	8.7	34.5	55.6	96.3	9.8
Female	6.6	0	0	.5	2.4	10.0	9.3	36.4	42.6	5.5
Urban	7.2	0	0	1.1	3.6	13.3	7.7	40.8	29.7	5.9
Rural	6.1	0	0	0	1.2	6.7	10.9	31.8	56.6	5.1
Large intestine:										
Male	15.2	0	.5	2.7	8.3	12.1	51.5	68.7	78.0	13.4
Urban	18.5	0	0	2.2	14.1	14.6	67.6	74.4	85.1	16.3
Rural	12.4	0	1.0	3.1	3.3	10.0	37.5	64.0	72.3	11.0
Female	20.1	0	1.1	3.3	8.9	26.6	51.7	93.8	92.8	17.2
Urban	23.6	0	2.0	4.3	8.5	33.5	50.6	98.8	122.6	19.3
Rural	16.8	0	0	2.1	9.3	20.0	53.1	88.4	60.8	15.1
Rectum:										
Male	12.9	0	1.1	1.1	8.3	20.1	31.5	66.4	51.2	11.6
Urban	15.0	0	1.1	2.2	12.9	24.8	38.0	69.3	45.0	13.6
Rural	11.2	0	1.1	0	4.4	16.2	25.9	64.0	56.2	9.9
Female	10.0	0	0	2.1	4.2	10.0	27.9	55.2	36.8	8.6
Urban	9.5	0	0	2.1	3.6	13.3	29.2	40.8	26.0	7.9
Rural	10.5	0	0	2.1	4.7	6.7	26.5	70.4	48.5	9.3
Respiratory system:										
Male	14.1	.3	0	1.1	4.8	28.9	66.1	38.5	26.7	12.9
Urban	21.2	0	0	2.2	6.5	48.2	97.4	56.5	25.0	19.2
Rural	8.3	.5	0	0	3.3	12.4	38.9	23.5	28.1	7.6
Female	3.8	.3	0	0	1.2	4.0	17.8	15.4	7.7	3.3
Urban	4.7	.7	0	0	2.4	4.0	18.4	17.2	14.9	4.0
Rural	3.0	0	0	0	0	4.0	17.2	13.6	0	2.7
Lung and bronchus:										
Male	11.8	0	0	1.1	3.6	23.5	56.9	33.9	20.0	10.8
Urban	18.3	0	0	2.2	5.2	40.9	80.9	53.9	25.0	16.5
Rural	6.4	0	0	0	2.2	8.7	36.0	17.1	16.1	5.9
Female	3.0	.3	0	0	1.2	4.0	12.4	12.1	5.8	2.6
Urban	3.6	.7	0	0	2.4	4.0	12.3	13.0	11.2	3.1
Rural	2.4	0	0	0	0	4.0	12.5	11.3	0	2.2

See footnotes at end of table.

Appendix table 3. Number of newly diagnosed resident cases of cancer in Iowa with microscopic confirmation of diagnosis per 100,000 population for urban and rural areas, by primary site, sex, and age—Continued

Primary site, sex, urban and rural areas	All ages, crude rate	Age (years)								Age adjusted rate [1]
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75 and over	
Breast:										
Male	.8	0	0	0	.6	2.0	.8	7.0	0	.8
Urban	1.2	0	0	0	0	2.9	1.7	10.3	0	1.1
Rural	.6	0	0	0	1.1	1.2	0	4.3	0	.5
Female	64.8	0	2.1	17.0	61.8	143.4	170.2	199.7	182.0	59.1
Urban	75.6	0	4.1	15.9	69.0	165.5	185.7	208.2	230.2	65.9
Rural	54.7	0	0	17.9	55.0	121.3	154.5	190.7	129.5	52.2
Female genital organs:										
Total	68.8	.9	4.7	25.6	81.5	152.7	193.5	165.5	147.1	64.2
Urban	86.1	1.4	5.1	34.0	112.7	166.9	216.4	191.1	219.1	77.0
Rural	52.7	.5	4.6	17.0	51.5	138.6	170.2	138.5	68.7	51.3
Cervix uteri:										
Total	31.0	0	1.1	20.7	54.1	72.7	68.1	54.1	54.2	29.9
Urban	41.6	0	2.0	28.6	77.5	84.1	79.8	66.5	92.9	38.6
Rural	21.0	0	0	12.7	31.6	61.3	56.2	40.9	12.1	21.1
Corpus uteri:										
Total	11.5	0	0	1.1	6.0	31.3	33.3	40.8	23.2	10.4
Urban	12.0	0	0	1.1	7.3	25.4	30.7	45.1	33.4	10.2
Rural	11.1	0	0	1.1	4.7	37.3	35.9	36.2	12.1	10.6
Uterus, other and unspecified:										
Total	9.2	0	1.6	1.6	5.4	18.0	36.4	18.8	27.1	8.3
Urban	12.3	0	2.1	1.1	6.1	26.7	44.5	25.8	33.4	10.6
Rural	6.2	0	1.2	2.1	4.7	9.3	28.1	11.4	20.2	6.0
Ovary:										
Total	12.4	.6	2.0	1.1	12.4	26.7	40.2	36.4	17.4	11.5
Urban	14.7	1.4	1.0	1.1	18.2	25.4	44.5	40.8	26.0	13.1
Rural	10.4	0	3.4	1.1	7.0	28.0	35.9	31.8	8.1	10.0
Male genital organs:										
Total	28.0	0	2.2	6.5	8.9	12.1	43.8	137.5	318.6	23.7
Urban	32.6	0	3.4	6.6	11.6	17.5	46.2	143.7	400.4	27.5
Rural	24.2	0	1.0	6.4	6.6	7.5	41.7	132.4	252.9	20.5
Prostate:										
Total	23.4	0	0	0	0	6.0	38.4	132.8	298.6	19.1
Urban	26.9	0	0	0	0	11.7	39.6	133.4	380.4	22.0
Rural	20.6	0	0	0	0	1.2	37.4	132.4	232.8	16.8
Urinary organs:										
Male	20.1	.8	.5	2.1	3.0	25.5	55.4	103.7	115.8	17.6
Urban	25.4	1.3	1.1	2.2	5.2	35.1	64.4	115.5	170.2	22.1
Rural	15.8	.5	0	2.1	1.1	17.4	47.5	93.9	72.3	13.9
Female	7.4	.9	1.1	.5	1.8	8.7	16.3	36.4	40.6	6.2
Urban	9.7	1.4	1.0	0	2.4	10.7	24.5	34.3	59.4	7.7
Rural	5.3	.5	1.1	1.1	1.2	6.7	7.8	38.6	20.2	4.8
Bladder:										
Male	16.6	0	.5	.5	2.4	22.1	44.6	85.0	109.1	14.5
Urban	21.0	0	1.1	1.1	3.9	33.6	49.5	89.8	160.2	18.2
Rural	13.2	0	0	0	1.1	12.4	40.3	81.1	68.3	11.4
Female	4.6	0	0	.5	1.8	4.0	6.2	24.3	38.7	3.7
Urban	6.5	0	0	0	2.4	6.7	9.2	27.9	55.7	4.9
Rural	2.8	0	0	1.1	1.2	1.3	3.1	20.4	20.2	2.5
Skin:										
Male	48.2	.3	2.7	8.1	19.0	69.8	124.5	224.9	267.3	42.9
Urban	58.9	.7	4.7	9.8	21.9	86.2	158.6	259.1	320.3	52.2
Rural	39.3	0	1.0	6.3	16.5	56.0	94.9	196.4	224.8	35.1
Female	29.8	.9	1.6	6.9	24.3	35.3	64.2	119.1	164.5	25.7
Urban	41.8	1.4	3.0	10.6	36.3	46.7	76.7	167.5	211.7	34.6
Rural	18.3	.5	0	3.2	12.9	24.0	51.5	68.1	113.2	16.5
Brain and nervous system:										
Male	3.7	1.4	1.1	1.6	4.2	7.4	10.0	8.2	0	3.6
Urban	5.4	2.6	1.1	2.2	7.8	5.8	13.2	18.0	0	5.2
Rural	2.2	.5	1.0	1.1	1.1	8.7	7.2	0	0	2.2
Female	2.5	1.2	2.7	.5	.6	4.0	10.1	3.3	0	2.4
Urban	3.0	1.3	4.1	1.1	1.2	2.7	10.7	4.3	0	2.8
Rural	2.1	1.0	1.1	0	0	5.3	9.4	2.3	0	2.0

See footnotes at end of table.

Appendix table 3. Number of newly diagnosed resident cases of cancer in Iowa with microscopic confirmation of diagnosis per 100,000 population for urban and rural areas, by primary site, sex, and age—Continued

Primary site, sex, urban and rural areas	All ages, crude rate	Age (years)							Age adjusted rate [1]
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75 and over	
Endocrine glands: [2]										
Male	1.7	.3	0	1.1	.6	3.4	6.9	3.5	2.2	1.6
Urban	2.4	.7	0	1.1	1.3	5.8	8.3	5.1	0	2.2
Rural	1.1	0	0	1.1	0	1.2	5.8	2.1	4.7	1.0
Female	2.4	.3	2.1	4.2	.6	4.0	6.2	4.4	0	2.4
Urban	3.2	0	1.0	5.3	1.2	8.0	6.1	6.4	0	3.0
Rural	1.8	.5	3.3	3.2	0	0	6.2	2.3	0	1.8
Bone:										
Male	1.6	.8	.5	1.6	1.8	1.3	.8	4.7	8.9	1.5
Urban	2.2	1.3	0	3.3	1.3	2.9	0	7.7	10.0	2.1
Rural	1.1	.5	1.0	0	2.2	0	1.4	2.1	8.0	1.0
Female	.8	0	0	.5	3.0	.7	.8	2.2	1.9	.8
Urban	.9	0	0	1.1	3.6	1.3	0	0	3.7	.9
Rural	.7	0	0	0	2.3	0	1.6	4.5	0	.7
Soft tissue:										
Male	2.1	.6	0	1.6	1.8	4.7	3.1	5.8	6.7	2.0
Urban	2.7	.7	0	2.2	1.3	7.3	1.7	12.8	5.0	2.6
Rural	1.5	.5	0	1.1	2.2	2.5	4.3	0	8.0	1.5
Female	1.8	.5	.5	0	3.0	4.0	3.9	1.1	5.8	1.6
Urban	1.4	.7	1.0	0	1.2	1.3	3.1	2.1	7.4	1.2
Rural	2.1	.5	0	0	4.7	6.7	4.7	0	4.0	2.1
Lymphatic tissue:										
Male	7.1	.8	1.6	6.5	5.3	11.4	22.3	15.1	15.6	6.8
Urban	9.6	.7	3.4	9.7	7.8	14.6	28.1	23.1	10.0	9.0
Rural	5.0	.9	0	3.2	3.3	8.7	17.3	8.5	20.1	4.7
Female	5.6	.3	2.1	3.2	4.8	12.0	10.1	18.8	13.6	5.2
Urban	6.8	.7	2.0	3.2	8.5	16.0	10.7	12.9	18.6	6.2
Rural	4.6	0	2.2	3.2	1.2	8.0	9.4	25.0	8.1	4.4
Hematopoietic system:										
Male	9.8	4.9	.5	2.2	5.9	14.1	24.6	29.1	37.9	9.0
Urban	10.8	6.5	0	3.3	7.8	14.6	26.4	33.4	30.0	10.0
Rural	8.9	3.7	1.0	1.1	4.4	13.7	23.0	25.6	44.2	8.1
Female	6.6	4.3	2.7	1.6	3.0	7.3	13.9	21.0	19.4	6.0
Urban	8.2	5.4	3.0	3.2	2.4	8.0	15.3	27.9	26.0	7.2
Rural	5.0	3.5	2.2	0	3.5	6.7	12.5	13.6	12.1	4.7
Other and ill-defined sites:										
Male	6.6	1.4	0	.5	.5	13.4	21.6	27.9	17.8	6.0
Urban	8.2	.7	0	1.1	1.3	11.7	29.6	43.6	15.0	7.3
Rural	5.4	1.9	0	0	0	15.0	14.3	14.9	16.1	4.2
Female	7.8	0	0	.5	4.2	14.7	28.6	21.0	1.0	6.8
Urban	9.7	0	0	0	7.3	14.6	38.4	23.6	33.4	8.2
Rural	5.9	0	0	1.1	1.2	14.7	18.7	18.1	28.4	5.4

[1] Adjusted on age distribution of the total population of the continental United States, 1950.
[2] Not elsewhere classified.

Appendix table 4. Number of newly diagnosed resident cases of cancer in Iowa for urban and rural areas, by primary site, sex, and age

Primary site, sex, urban and rural areas	All ages	Age																
		0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85 and over
All sites	*9,088*	*54*	*28*	*22*	*35*	*46*	*86*	*155*	*266*	*322*	*526*	*823*	*1,009*	*1,147*	*1,205*	*1,198*	*1,028*	*727*	*420*
Male	4,449	32	18	10	14	20	38	59	96	100	188	372	460	586	619	645	551	416	225
Urban	2,386	18	12	3	9	12	30	35	58	54	111	207	249	354	348	316	280	194	96
Rural	2,063	14	6	7	5	8	8	24	38	46	77	165	211	232	271	329	271	222	129
Female	4,639	22	10	12	21	26	48	96	170	222	338	451	540	561	586	553	477	311	195
Urban	2,678	15	6	6	14	17	27	58	110	140	198	263	290	332	328	297	291	183	103
Rural	1,961	7	4	6	7	9	21	38	60	82	140	188	250	229	258	256	186	128	92
Buccal cavity and pharynx	*490*	*0*	*1*	*1*	*5*	*2*	*9*	*12*	*11*	*25*	*31*	*48*	*47*	*62*	*70*	*62*	*52*	*33*	*19*
Male	408	0	1	0	4	2	8	7	11	20	26	32	36	58	55	54	46	30	18
Urban	217	0	1	0	3	1	6	5	4	7	15	15	13	34	32	29	29	16	7
Rural	191	0	0	0	1	1	2	2	7	13	11	17	23	24	23	25	17	14	11
Female	82	0	0	1	1	0	1	5	0	5	5	16	11	4	15	8	6	3	1
Urban	53	0	0	1	1	0	0	4	0	3	4	10	5	1	10	6	5	2	1
Rural	29	0	0	0	0	0	1	1	0	2	1	6	6	3	5	2	1	1	0
Lip	*255*	*0*	*0*	*0*	*0*	*0*	*4*	*3*	*5*	*15*	*21*	*28*	*27*	*33*	*32*	*33*	*24*	*21*	*9*
Male	240	0	0	0	0	0	4	3	5	15	20	22	27	32	32	30	22	19	9
Urban	117	0	0	0	0	0	4	3	1	4	10	9	7	16	19	18	14	9	3
Rural	123	0	0	0	0	0	0	0	4	11	10	13	20	16	13	12	8	10	6
Female	15	0	0	0	0	0	0	0	0	0	1	6	0	1	0	3	2	2	0
Urban	9	0	0	0	0	0	0	0	0	0	1	3	0	0	0	3	1	1	0
Rural	6	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	1	1	0
Tongue	*31*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*2*	*8*	*4*	*3*	*4*	*5*	*3*	*1*	*1*
Male	20	0	0	0	0	0	0	0	0	0	1	4	1	3	2	5	2	1	1
Urban	11	0	0	0	0	0	0	0	0	0	1	2	0	2	1	3	1	1	0
Rural	9	0	0	0	0	0	0	0	0	0	0	2	1	1	1	2	1	0	1
Female	11	0	0	0	0	0	0	0	0	0	1	4	3	0	2	0	1	0	0
Urban	6	0	0	0	0	0	0	0	0	0	1	3	0	0	1	0	1	0	0
Rural	5	0	0	0	0	0	0	0	0	0	0	1	3	0	1	0	0	0	0
Salivary glands	*67*	*0*	*0*	*0*	*1*	*1*	*4*	*7*	*3*	*3*	*3*	*4*	*7*	*2*	*12*	*5*	*11*	*2*	*2*
Male	36	0	0	0	0	1	3	2	3	0	1	1	2	2	7	2	8	2	2
Urban	20	0	0	0	0	0	1	0	1	0	1	1	1	2	4	2	5	1	1
Rural	16	0	0	0	0	1	2	2	2	0	0	0	1	0	3	0	3	1	1
Female	31	0	0	0	1	0	1	5	0	3	2	3	5	0	5	3	3	0	0
Urban	20	0	0	0	1	0	0	4	0	1	1	2	3	0	4	1	3	0	0
Rural	11	0	0	0	0	0	1	1	0	2	1	1	2	0	1	2	0	0	0
Mouth, other	*88*	*0*	*1*	*1*	*3*	*1*	*0*	*2*	*1*	*5*	*4*	*3*	*6*	*14*	*17*	*11*	*9*	*5*	*5*
Male	71	0	1	0	3	1	0	2	1	3	3	2	3	12	12	10	9	5	4
Urban	40	0	1	0	2	1	0	2	0	2	2	1	3	8	6	5	4	2	1
Rural	31	0	0	0	1	0	0	0	1	1	1	1	0	4	6	5	5	3	3
Female	17	0	0	1	0	0	0	0	0	2	1	1	3	2	5	1	0	0	1
Urban	15	0	0	1	0	0	0	0	0	2	1	1	2	1	5	1	0	0	1
Rural	2	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0

Appendix table 4. Number of newly diagnosed resident cases of cancer in Iowa for urban and rural areas, by primary site, sex, and age—Continued

Primary site, sex, urban and rural areas	All ages	Age																
		0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	46–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85 and over
Buccal cavity and pharynx—Continued																			
Pharynx	*49*	*0*	*0*	*0*	*1*	*0*	*1*	*0*	*2*	*2*	*1*	*5*	*3*	*10*	*5*	*8*	*5*	*4*	*2*
Male	41	0	0	0	1	0	1	0	2	2	1	3	3	9	2	7	5	3	2
Urban	29	0	0	0	1	0	1	0	2	1	1	2	2	6	2	1	5	3	2
Rural	12	0	0	0	0	0	0	0	0	1	0	1	1	3	0	6	0	0	0
Female	8	0	0	0	0	0	0	0	0	0	0	2	0	1	3	1	0	1	0
Urban	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0
Rural	5	0	0	0	0	0	0	0	0	0	0	1	0	1	3	0	0	0	0
Digestive system	*2,284*	*3*	*0*	*0*	*4*	*2*	*9*	*13*	*37*	*40*	*53*	*150*	*222*	*268*	*334*	*384*	*351*	*273*	*141*
Male	1,189	2	0	0	1	2	2	7	24	19	26	80	123	147	184	194	174	139	65
Urban	606	1	0	0	0	1	2	3	17	13	12	46	71	94	93	86	78	62	27
Rural	583	1	0	0	1	1	0	4	7	6	14	34	52	53	91	108	96	77	38
Female	1,095	1	0	0	3	0	7	6	13	21	27	70	99	121	150	190	177	134	76
Urban	567	1	0	0	2	0	4	4	7	11	18	45	49	65	75	89	90	77	30
Rural	528	0	0	0	1	0	3	2	6	10	9	25	50	56	75	101	87	57	46
Esophagus	*61*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*5*	*5*	*8*	*11*	*12*	*10*	*6*	*3*
Male	45	0	0	0	0	0	0	0	0	1	0	5	5	7	5	11	6	3	2
Urban	27	0	0	0	0	0	0	0	0	1	0	3	4	5	2	6	2	2	2
Rural	18	0	0	0	0	0	0	0	0	0	0	2	1	2	3	5	4	1	0
Female	16	0	0	0	0	0	0	0	0	0	0	0	0	1	6	1	4	3	1
Urban	6	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	2	1
Rural	10	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1	4	1	0
Stomach	*626*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*3*	*5*	*10*	*33*	*53*	*49*	*84*	*106*	*138*	*96*	*48*
Male	391	0	0	0	0	0	0	0	1	2	8	15	40	37	57	73	86	48	24
Urban	176	0	0	0	0	0	0	0	0	2	3	8	21	21	27	31	35	22	6
Rural	215	0	0	0	0	0	0	0	1	0	5	7	19	16	30	42	51	26	18
Female	235	0	0	0	0	0	1	0	2	3	2	18	13	12	27	33	52	48	24
Urban	113	0	0	0	0	0	1	0	2	2	0	13	8	4	14	16	20	24	9
Rural	122	0	0	0	0	0	0	0	0	1	2	5	5	8	13	17	32	24	15
Small intestine	*31*	*2*	*0*	*0*	*1*	*0*	*0*	*0*	*1*	*1*	*2*	*3*	*5*	*3*	*2*	*3*	*3*	*3*	*2*
Male	19	2	0	0	0	0	0	0	1	1	2	2	3	2	0	2	2	1	1
Urban	10	1	0	0	0	0	0	0	1	0	1	1	1	2	0	1	2	0	0
Rural	9	1	0	0	0	0	0	0	0	1	1	1	2	0	0	1	0	1	1
Female	12	0	0	0	1	0	0	0	0	0	0	1	2	1	2	1	1	2	1
Urban	8	0	0	0	0	0	0	0	0	0	0	1	2	0	1	1	1	2	0
Rural	4	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	1
Large intestine	*738*	*0*	*0*	*0*	*3*	*0*	*5*	*8*	*16*	*19*	*21*	*45*	*69*	*94*	*105*	*123*	*102*	*79*	*49*
Male	321	0	0	0	1	0	2	4	8	9	3	19	29	47	53	47	36	42	21
Urban	175	0	0	0	0	0	2	1	6	6	1	10	17	32	31	20	18	23	8
Rural	146	0	0	0	1	0	0	3	2	3	2	9	12	15	22	27	18	19	13
Female	417	0	0	0	2	0	3	4	8	10	18	26	40	47	52	76	66	37	28
Urban	233	0	0	0	2	0	2	3	5	5	12	14	22	22	31	38	40	22	15
Rural	184	0	0	0	0	0	1	1	3	5	6	12	18	25	21	38	26	15	13

Rectum	*375*	*0*	*0*	*0*	*0*	*2*	*2*	*4*	*13*	*8*	*10*	*36*	*44*	*46*	*65*	*63*	*37*	*32*	*13*
Male	211	0	0	0	0	2	0	2	11	3	8	22	29	20	36	32	18	19	9
Urban	109	0	0	0	0	1	0	2	8	2	4	13	17	10	16	15	9	7	5
Rural	102	0	0	0	0	1	0	0	3	1	4	9	12	10	20	17	9	12	4
Female	164	0	0	0	0	0	2	2	2	5	2	14	15	26	29	31	19	13	4
Urban	78	0	0	0	0	0	1	1	0	3	2	9	5	18	10	12	9	8	0
Rural	86	0	0	0	0	0	1	1	2	2	0	5	10	8	19	19	10	5	4
Liver	*130*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*3*	*1*	*5*	*6*	*13*	*22*	*23*	*23*	*16*	*16*
Male	55	0	0	0	0	0	0	0	0	1	0	4	2	8	12	8	7	8	5
Urban	27	0	0	0	0	0	0	0	0	1	0	2	2	7	5	2	3	2	3
Rural	28	0	0	0	0	0	0	0	0	0	0	2	0	1	7	6	4	6	2
Female	75	1	0	0	0	0	0	0	1	2	1	1	4	5	10	15	16	8	11
Urban	32	1	0	0	0	0	0	0	0	1	1	0	1	2	6	6	8	3	3
Rural	43	0	0	0	0	0	0	0	1	1	0	1	3	3	4	9	8	5	8
Gall bladder and biliary passages	*86*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*1*	*1*	*1*	*4*	*10*	*12*	*15*	*18*	*9*	*13*	*1*
Male	24	0	0	0	0	0	0	0	1	1	0	0	2	2	4	6	4	4	0
Urban	10	0	0	0	0	0	0	0	0	0	0	0	1	1	1	4	2	1	0
Rural	14	0	0	0	0	0	0	0	1	1	0	0	1	1	3	2	2	3	0
Female	62	0	0	0	0	0	1	0	0	0	1	4	8	10	11	12	5	9	1
Urban	34	0	0	0	0	0	0	0	0	0	1	4	3	6	3	7	3	7	0
Rural	28	0	0	0	0	0	1	0	0	0	0	0	5	4	8	5	2	2	1
Pancreas	*188*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*1*	*6*	*13*	*26*	*37*	*25*	*26*	*22*	*24*	*6*
Male	105	0	0	0	0	0	0	1	1	1	3	11	11	23	15	12	12	12	3
Urban	62	0	0	0	0	0	0	0	1	1	2	7	7	16	10	5	6	4	3
Rural	43	0	0	0	0	0	0	1	0	0	1	4	4	7	5	7	6	8	0
Female	83	0	0	0	0	0	0	0	0	0	3	2	15	14	10	14	10	12	3
Urban	48	0	0	0	0	0	0	0	0	0	2	1	7	9	6	7	7	8	1
Rural	35	0	0	0	0	0	0	0	0	0	1	1	8	5	4	7	3	4	2
Other digestive	*49*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*2*	*6*	*4*	*6*	*5*	*10*	*7*	*4*	*3*
Male	18	0	0	0	0	0	0	0	1	0	2	2	2	1	2	3	3	2	0
Urban	10	0	0	0	0	0	0	0	1	0	1	2	1	0	1	2	1	1	0
Rural	8	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	2	1	0
Female	31	0	0	0	0	0	0	0	0	1	0	4	2	5	3	7	4	2	3
Urban	15	0	0	0	0	0	0	0	0	0	0	3	1	4	1	2	2	1	1
Rural	16	0	0	0	0	0	0	0	0	1	0	1	1	1	2	5	2	1	2
Respiratory system	*437*	*2*	*1*	*1*	*0*	*0*	*0*	*3*	*2*	*13*	*27*	*48*	*74*	*88*	*66*	*45*	*40*	*17*	*10*
Male	317	1	0	0	0	0	0	3	2	10	20	39	57	71	46	24	26	13	5
Urban	220	0	0	0	0	0	0	3	2	5	13	30	39	50	34	20	13	7	4
Rural	97	1	0	0	0	0	0	0	0	5	7	9	18	21	12	4	13	6	1
Female	120	1	1	1	0	0	0	0	0	3	7	9	17	17	20	21	14	4	5
Urban	71	1	1	0	0	0	0	0	0	3	5	5	8	10	14	9	11	2	2
Rural	49	0	0	1	0	0	0	0	0	0	2	4	9	7	6	12	3	2	3
Larynx	*37*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*3*	*1*	*7*	*8*	*9*	*2*	*3*	*3*	*1*	*0*
Male	30	0	0	0	0	0	0	0	0	3	1	6	7	7	1	2	2	1	0
Urban	19	0	0	0	0	0	0	0	0	1	0	4	7	5	1	1	0	0	0
Rural	11	0	0	0	0	0	0	0	0	2	1	2	0	2	0	1	2	1	0
Female	7	0	0	0	0	0	0	0	0	0	0	1	1	2	1	1	1	0	0
Urban	7	0	0	0	0	0	0	0	0	0	0	1	1	2	1	1	1	0	0
Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix table 4. Number of newly diagnosed resident cases of cancer in Iowa for urban and rural areas, by primary site, sex, and age—Continued

Primary site, sex, urban and rural areas	All ages	Age																
		0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85 and over
Respiratory system—Continued																			
Lung and bronchus	*379*	*1*	*1*	*1*	*0*	*0*	*0*	*3*	*2*	*10*	*26*	*39*	*65*	*75*	*60*	*39*	*34*	*14*	
Male	277	0	0	0	0	0	0	3	2	7	19	32	50	63	42	21	22	11	5
Urban	195	0	0	0	0	0	0	3	2	4	13	25	32	44	31	19	12	6	4
Rural	82	0	0	0	0	0	0	0	0	3	6	7	18	19	11	2	10	5	1
Female	102	1	1	1	0	0	0	0	0	3	7	7	15	12	18	18	12	3	4
Urban	61	1	1	0	0	0	0	0	0	3	5	4	7	7	13	7	9	2	2
Rural	41	0	0	1	0	0	0	0	0	0	2	3	8	5	5	11	3	1	2
Other respiratory	*21*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*2*	*1*	*4*	*4*	*3*	*3*	*2*	*1*
Male	10	1	0	0	0	0	0	0	0	0	0	1	0	1	3	1	2	1	0
Urban	6	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	1	1	0
Rural	4	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0
Female	11	0	0	0	0	0	0	0	0	0	0	1	1	3	1	2	1	1	1
Urban	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0
Rural	8	0	0	0	0	0	0	0	0	0	0	1	1	2	1	1	0	1	1
Breast	*1047*	*0*	*0*	*0*	*0*	*6*	*11*	*22*	*46*	*68*	*106*	*134*	*127*	*128*	*134*	*98*	*91*	*48*	*28*
Male	15	0	0	0	0	0	0	0	0	1	1	2	0	4	4	3	0	0	0
Urban	10	0	0	0	0	0	0	0	0	0	0	2	0	4	1	3	0	0	0
Rural	5	0	0	0	0	0	0	0	0	1	1	0	0	0	3	0	0	0	0
Female	1,032	0	0	0	0	6	11	22	46	67	105	132	127	124	130	95	91	48	28
Urban	580	0	0	0	0	6	4	11	26	37	59	75	63	80	72	47	58	28	14
Rural	452	0	0	0	0	0	7	11	20	30	46	57	64	44	58	48	33	20	14
Female genital organs	*1,058*	*1*	*0*	*2*	*3*	*6*	*18*	*34*	*71*	*81*	*114*	*132*	*150*	*137*	*103*	*85*	*70*	*31*	*20*
Urban	636	0	0	2	1	4	14	19	48	56	64	72	85	79	54	53	54	18	13
Rural	422	1	0	0	2	2	4	15	23	25	50	60	65	58	49	32	16	13	7
Cervix uteri	*460*	*0*	*0*	*0*	*0*	*2*	*16*	*25*	*50*	*51*	*67*	*49*	*59*	*39*	*35*	*26*	*23*	*11*	*7*
Urban	299	0	0	0	0	2	12	16	35	38	42	27	37	20	20	16	20	8	6
Rural	161	0	0	0	0	0	4	9	15	13	25	22	22	19	15	10	3	3	1
Corpus uteri	*159*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*3*	*7*	*19*	*30*	*22*	*24*	*21*	*16*	*10*	*4*	*1*
Urban	82	0	0	0	0	0	1	0	2	4	7	14	9	13	10	11	9	1	1
Rural	77	0	0	0	0	0	0	1	1	3	12	16	13	11	11	5	1	3	0
Uterus, other and unspecified	*175*	*0*	*0*	*0*	*0*	*3*	*0*	*3*	*4*	*8*	*11*	*22*	*28*	*33*	*15*	*13*	*22*	*8*	*5*
Urban	105	0	0	0	0	2	0	1	3	3	6	16	15	24	7	10	14	3	1
Rural	70	0	0	0	0	1	0	2	1	5	5	6	13	9	8	3	8	5	4
Ovary	*196*	*0*	*0*	*2*	*3*	*1*	*0*	*4*	*9*	*13*	*16*	*26*	*30*	*31*	*25*	*22*	*10*	*1*	*3*
Urban	109	0	0	2	1	0	0	1	5	10	9	11	17	17	11	15	8	0	2
Rural	87	0	0	0	2	1	0	3	4	3	7	15	13	14	14	7	2	1	1
Other female genital organs	*68*	*1*	*0*	*0*	*0*	*0*	*1*	*1*	*5*	*2*	*1*	*5*	*11*	*10*	*7*	*8*	*5*	*7*	*4*
Urban	41	0	0	0	0	0	1	1	3	1	0	4	7	5	6	1	3	6	3
Rural	27	1	0	0	0	0	0	0	2	1	1	1	4	5	1	7	2	1	1

Male genital organs	*647*	*0*	*0*	*0*	*2*	*2*	*6*	*6*	*14*	*4*	*6*	*22*	*30*	*65*	*84*	*120*	*134*	*103*	*49*
Urban	309	0	0	0	1	2	3	3	8	2	4	16	14	30	38	53	66	53	16
Rural	338	0	0	0	1	0	3	3	6	2	2	6	16	35	46	67	68	50	33
Prostate	*578*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*2*	*15*	*23*	*61*	*81*	*118*	*128*	*100*	*49*
Urban	274	0	0	0	0	0	0	0	0	0	2	14	10	30	36	51	64	51	16
Rural	304	0	0	0	0	0	0	0	0	1	0	1	13	31	45	67	64	49	33
Other male genital organs	*69*	*0*	*0*	*0*	*2*	*2*	*6*	*6*	*14*	*3*	*4*	*7*	*7*	*4*	*3*	*2*	*6*	*3*	*0*
Urban	35	0	0	0	1	2	3	3	8	2	2	2	4	0	2	2	2	2	0
Rural	34	0	0	0	1	0	3	3	6	1	2	5	3	4	1	0	4	1	0
Urinary organs	*439*	*9*	*1*	*1*	*0*	*3*	*1*	*5*	*2*	*6*	*18*	*40*	*45*	*64*	*58*	*83*	*54*	*28*	*21*
Male	307	4	1	0	0	1	1	3	1	4	11	32	33	48	37	61	36	18	16
Urban	171	3	1	0	0	1	1	1	1	3	7	21	14	29	19	31	23	7	9
Rural	136	1	0	0	0	0	0	2	0	1	4	11	19	19	18	30	13	11	7
Female	132	5	0	1	0	2	0	2	1	2	7	8	12	16	21	22	18	10	5
Urban	85	4	0	0	0	1	0	1	1	1	4	5	8	13	12	11	12	7	5
Rural	47	1	0	1	0	1	0	1	0	1	3	3	4	3	9	11	6	3	0
Kidney	*103*	*9*	*1*	*1*	*0*	*2*	*1*	*3*	*0*	*1*	*3*	*10*	*13*	*16*	*15*	*20*	*3*	*4*	*1*
Male	59	4	1	0	0	0	1	2	0	1	0	7	6	10	8	14	2	3	0
Urban	32	3	1	0	0	0	1	0	0	1	0	2	3	6	4	9	1	1	0
Rural	27	1	0	0	0	0	0	2	0	0	0	5	3	4	4	5	1	2	0
Female	44	5	0	1	0	2	0	1	0	0	3	3	7	6	7	6	1	1	1
Urban	23	4	0	0	0	1	0	1	0	0	1	1	6	4	2	2	0	0	1
Rural	21	1	0	1	0	1	0	0	0	0	2	2	1	2	5	4	1	1	0
Bladder	*328*	*0*	*0*	*0*	*0*	*1*	*0*	*2*	*2*	*5*	*13*	*30*	*31*	*46*	*43*	*62*	*51*	*23*	*19*
Male	246	0	0	0	0	1	0	1	1	3	11	25	27	38	29	46	34	15	15
Urban	138	0	0	0	0	1	0	1	1	2	7	19	11	23	15	22	22	6	8
Rural	108	0	0	0	0	0	0	0	0	1	4	6	16	15	14	24	12	9	7
Female	82	0	0	0	0	0	0	1	1	2	2	5	4	8	14	16	17	8	4
Urban	57	0	0	0	0	0	0	0	1	1	2	4	1	7	10	9	12	6	4
Rural	25	0	0	0	0	0	0	1	0	1	0	1	3	1	4	7	5	2	0
Other urinary	*8*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*2*	*0*	*1*	*2*	*0*	*1*	*0*	*1*	*1*
Male	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Urban	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Rural	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Female	6	0	0	0	0	0	0	0	0	0	2	0	1	2	0	0	0	1	0
Urban	5	0	0	0	0	0	0	0	0	0	1	0	1	2	0	0	0	1	0
Rural	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Skin	*1,463*	*1*	*2*	*1*	*5*	*6*	*9*	*23*	*43*	*44*	*71*	*144*	*147*	*177*	*209*	*217*	*156*	*124*	*84*
Male	913	0	1	0	2	5	7	11	20	20	43	107	103	109	136	129	92	80	48
Urban	491	0	1	0	2	4	6	5	9	11	26	51	50	70	82	60	55	38	21
Rural	422	0	0	0	0	1	1	6	11	9	17	56	53	39	54	69	37	42	27
Female	550	1	1	1	3	1	2	12	23	24	28	37	44	68	73	88	64	44	36
Urban	356	1	0	1	3	0	2	8	18	16	19	24	28	41	50	59	38	27	21
Rural	194	0	1	0	0	1	0	4	5	8	9	13	16	27	23	29	26	17	15

Appendix table 4. Number of newly diagnosed resident cases of cancer in Iowa for urban and rural areas, by primary site, sex, and age—Continued

Primary site, sex, urban and rural areas	All ages	Age																
		0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85 and over
Eye	*16*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*3*	*1*	*2*	*1*	*3*	*2*	*1*	*0*	*1*
Male	11	2	0	0	0	0	0	0	0	0	2	1	1	0	3	0	1	0	1
Urban	3	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Rural	8	1	0	0	0	0	0	0	0	0	1	1	1	0	2	0	1	0	1
Female	5	0	0	0	0	0	0	0	0	0	1	0	1	1	0	2	0	0	0
Urban	4	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0
Rural	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Brain and nervous system	*124*	*4*	*5*	*4*	*5*	*6*	*1*	*5*	*9*	*5*	*14*	*14*	*19*	*18*	*9*	*6*	*0*	*0*	*0*
Male	81	3	3	2	2	3	0	4	7	4	8	12	9	14	5	5	0	0	0
Urban	49	3	2	0	1	0	0	2	6	3	4	6	6	7	4	5	0	0	0
Rural	32	0	1	2	1	3	0	2	1	1	4	6	3	7	1	0	0	0	0
Female	43	1	2	2	3	3	1	1	2	1	6	2	10	4	4	1	0	0	0
Urban	25	1	2	0	3	2	0	1	1	1	2	1	5	2	3	1	0	0	0
Rural	18	0	0	2	0	1	1	0	1	0	4	1	5	2	1	0	0	0	0
Brain	*111*	*4*	*5*	*3*	*5*	*6*	*1*	*5*	*8*	*5*	*11*	*12*	*17*	*14*	*9*	*6*	*0*	*0*	*0*
Male	75	3	3	2	2	3	0	4	6	4	7	11	9	11	5	5	0	0	0
Urban	46	3	2	0	1	0	0	2	5	3	4	6	6	5	4	5	0	0	0
Rural	29	0	1	2	1	3	0	2	1	1	3	5	3	6	1	0	0	0	0
Female	36	1	2	1	3	3	1	1	2	1	4	1	8	3	4	1	0	0	0
Urban	20	1	2	0	3	2	0	1	1	1	1	0	3	1	3	1	0	0	0
Rural	16	0	0	1	0	1	1	0	1	0	3	1	5	2	1	0	0	0	0
Other nervous system	*13*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*1*	*0*	*3*	*2*	*2*	*4*	*0*	*0*	*0*	*0*	*0*
Male	6	0	0	0	0	0	0	0	1	0	1	1	0	3	0	0	0	0	0
Urban	3	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0
Rural	3	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0
Female	7	0	0	1	0	0	0	0	0	0	2	1	2	1	0	0	0	0	0
Urban	5	0	0	0	0	0	0	0	0	0	1	1	2	1	0	0	0	0	0
Rural	2	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Endocrine glands[1]	*66*	*0*	*1*	*1*	*3*	*1*	*3*	*7*	*1*	*1*	*6*	*6*	*13*	*7*	*5*	*6*	*1*	*3*	*1*
Male	25	0	0	1	0	0	1	1	0	1	3	3	4	5	2	2	1	1	0
Urban	14	0	0	1	0	0	0	1	0	1	2	2	3	2	0	2	0	0	0
Rural	11	0	0	0	0	0	1	0	0	0	1	1	1	3	2	0	1	1	0
Female	41	0	1	0	3	1	2	6	1	0	3	3	9	2	3	4	0	2	1
Urban	24	0	0	0	0	1	0	5	1	0	3	3	4	2	3	2	0	0	0
Rural	17	0	1	0	3	0	2	1	0	0	0	0	5	0	0	2	0	2	1
Thyroid	*57*	*0*	*0*	*1*	*2*	*1*	*3*	*6*	*1*	*1*	*4*	*5*	*13*	*5*	*4*	*6*	*1*	*3*	*1*
Male	20	0	0	1	0	0	1	1	0	1	2	2	4	3	1	2	1	1	0
Urban	13	0	0	1	0	0	0	1	0	1	1	2	3	2	0	2	0	0	0
Rural	7	0	0	0	0	0	1	0	0	0	1	0	1	1	1	0	1	1	0
Female	37	0	0	0	2	1	2	5	1	0	2	3	9	2	3	4	0	2	1
Urban	22	0	0	0	0	1	0	4	1	0	2	3	4	2	3	2	0	0	0
Rural	15	0	0	0	2	0	2	1	0	0	0	0	5	0	0	2	0	2	1

Other endocrines	*9*	*0*	*1*	*0*	*1*	*0*	*0*	*1*	*0*	*0*	*2*	*1*	*0*	*2*	*1*	*0*	*0*	*0*	*0*
Male	5	0	0	0	0	0	0	0	0	0	1	1	0	2	1	0	0	0	0
Urban	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Rural	4	0	0	0	0	0	0	0	0	0	0	1	0	2	1	0	0	0	0
Female	4	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0
Urban	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
Rural	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bone	*58*	*2*	*0*	*2*	*1*	*1*	*3*	*2*	*5*	*3*	*1*	*4*	*4*	*3*	*9*	*4*	*8*	*5*	*1*
Male	36	2	0	1	1	1	2	1	3	0	0	3	0	1	5	4	7	5	0
Urban	17	1	0	1	1	0	2	1	1	0	0	2	0	0	2	3	3	0	0
Rural	19	1	0	0	0	1	0	0	2	0	0	1	0	1	3	1	4	5	0
Female	22	0	0	1	0	0	1	1	2	3	1	1	4	2	4	0	1	0	1
Urban	11	0	0	0	0	0	0	1	1	2	0	1	2	2	0	0	1	0	1
Rural	11	0	0	1	0	0	1	0	1	1	1	0	2	0	4	0	0	0	0
Soft tissue	*55*	*2*	*2*	*1*	*1*	*0*	*2*	*1*	*6*	*2*	*9*	*4*	*7*	*5*	*4*	*2*	*2*	*3*	*2*
Male	30	1	2	0	0	0	2	1	1	2	6	1	4	1	3	2	0	2	2
Urban	18	0	1	0	0	0	2	0	1	0	4	1	2	0	3	2	0	1	1
Rural	12	1	1	0	0	0	0	1	0	2	2	0	2	1	0	0	0	1	1
Female	25	1	0	1	1	0	0	0	5	0	3	3	3	4	1	0	2	1	0
Urban	10	0	0	1	1	0	0	0	1	0	0	1	0	3	1	0	2	0	0
Rural	15	1	0	0	0	0	0	0	4	0	3	2	3	1	0	0	0	1	0
Lymphatic tissue	*214*	*1*	*0*	*4*	*2*	*7*	*12*	*12*	*8*	*11*	*24*	*20*	*28*	*24*	*26*	*15*	*8*	*9*	*3*
Male	124	1	0	3	1	3	7	10	6	5	16	8	22	13	10	7	6	4	2
Urban	77	0	0	1	1	3	6	7	5	3	11	3	13	9	6	5	1	2	1
Rural	47	1	0	2	0	0	1	3	1	2	5	5	9	4	4	2	5	2	1
Female	90	0	0	1	1	4	5	2	2	6	8	12	6	11	16	8	2	5	1
Urban	51	0	0	1	1	1	3	0	2	5	6	8	2	7	6	3	2	3	1
Rural	39	0	0	0	0	3	2	2	0	1	2	4	4	4	10	5	0	2	0
Hematopoietic system	*315*	*26*	*13*	*3*	*3*	*4*	*2*	*8*	*6*	*16*	*21*	*25*	*33*	*43*	*41*	*24*	*25*	*16*	*6*
Male	181	15	9	2	1	1	2	4	6	10	14	17	14	25	20	15	13	10	3
Urban	91	9	6	0	0	0	2	3	3	6	8	8	8	11	13	6	4	3	1
Rural	90	6	3	2	1	1	0	1	3	4	6	9	6	14	7	9	9	7	2
Female	134	11	4	1	2	3	0	4	0	6	7	8	19	18	21	9	12	6	3
Urban	81	7	2	0	1	2	0	4	0	3	3	5	10	10	15	5	7	5	2
Rural	53	4	2	1	1	1	0	0	0	3	4	3	9	8	6	4	5	1	1
Ill-defined sites	*375*	*1*	*2*	*1*	*1*	*0*	*0*	*2*	*5*	*3*	*22*	*31*	*52*	*57*	*50*	*45*	*35*	*34*	*34*
Male	165	1	1	1	0	0	0	1	1	0	6	13	24	25	25	25	15	11	16
Urban	93	0	0	0	0	0	0	1	1	0	4	4	16	14	20	11	8	5	9
Rural	72	1	1	1	0	0	0	0	0	0	2	9	8	11	5	14	7	6	7
Female	210	0	1	0	1	0	0	1	4	3	16	18	28	32	25	20	20	23	18
Urban	124	0	1	0	1	0	0	0	4	2	10	8	20	16	13	11	11	14	13
Rural	86	0	0	0	0	0	0	1	0	1	6	10	8	16	12	9	9	9	5

[1] Not elsewhere classified.

Appendix table 5. Number of newly diagnosed resident cases of cancer in Iowa with microscopic confirmation of diagnosis, for urban and rural areas, by primary site, sex, and age

Primary site, sex, urban and rural areas	All ages	Age (years)								
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over
All sites:										
Male:										
Urban	1,600	25	17	51	94	244	448	440	242	39
Rural	1,254	20	9	29	63	175	320	375	221	42
Female:										
Urban	1,968	21	27	81	222	398	484	444	255	36
Rural	1,369	14	14	51	131	285	382	343	130	19
Buccal cavity and pharynx:										
Male:										
Urban	158	1	4	7	10	24	36	47	26	3
Rural	137	0	2	4	15	22	33	36	19	6
Female:										
Urban	46	1	1	4	3	9	6	14	7	1
Rural	26	0	0	2	2	6	9	6	1	0
Lip:										
Male:										
Urban	78	0	0	4	4	14	15	29	11	1
Rural	83	0	0	0	11	17	26	16	11	2
Female:										
Urban	8	0	0	0	0	3	0	3	2	0
Rural	4	0	0	0	0	2	1	0	1	0
Tongue:										
Male:										
Urban	9	0	0	0	0	3	2	3	1	0
Rural	7	0	0	0	0	2	2	2	0	1
Female:										
Urban	5	0	0	0	0	3	0	1	1	0
Rural	5	0	0	0	0	1	3	1	0	0
Salivary glands:										
Male:										
Urban	15	0	0	1	1	2	2	4	5	0
Rural	13	0	1	4	1	0	1	3	2	1
Female:										
Urban	17	0	1	4	1	1	3	4	3	0
Rural	11	0	0	2	2	2	2	3	0	0
Mouth, other:										
Male:										
Urban	35	1	3	2	2	3	11	8	4	1
Rural	26	0	1	0	2	2	2	11	6	2
Female:										
Urban	14	1	0	0	2	2	3	5	0	1
Rural	2	0	0	0	0	0	2	0	0	0
Pharynx:										
Male:										
Urban	21	0	1	0	3	2	6	3	5	1
Rural	8	0	0	0	1	1	2	4	0	0
Female:										
Urban	2	0	0	0	0	0	0	1	1	0
Rural	4	0	0	0	0	1	1	2	0	0
Digestive system:										
Male:										
Urban	368	1	1	4	27	47	124	109	52	3
Rural	306	1	2	4	10	37	81	103	60	8
Female:										
Urban	329	1	2	7	14	55	83	106	55	6
Rural	287	0	1	5	15	27	76	110	47	6
Esophagus:										
Male:										
Urban	22	0	0	0	1	3	7	7	3	1
Rural	9	0	0	0	0	1	2	3	3	0
Female:										
Urban	3	0	0	0	0	0	0	2	0	1
Rural	5	0	0	0	0	0	1	2	2	0

Appendix table 5. Number of newly diagnosed resident cases of cancer in Iowa with microscopic confirmation of diagnosis, for urban and rural areas, by primary site, sex, and age—Continued

Primary site, sex, urban and rural areas	All ages	Age (years)								
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over
Digestive system—Continued										
Stomach:										
Male:										
Urban	86	0	0	0	1	8	25	32	20	0
Rural	82	0	0	0	1	7	24	26	22	2
Female:										
Urban	46	0	0	1	3	10	5	19	7	1
Rural	41	0	0	0	1	5	7	14	13	1
Small intestine:										
Male:										
Urban	8	1	0	0	1	2	3	0	1	0
Rural	6	1	0	0	1	2	1	1	0	0
Female:										
Urban	6	0	0	0	0	1	2	1	2	0
Rural	3	0	1	0	0	0	1	1	0	0
Large intestine:										
Male:										
Urban	110	0	0	2	11	10	41	29	15	2
Rural	89	0	1	3	3	8	26	30	15	3
Female:										
Urban	150	0	2	4	7	25	33	46	29	4
Rural	113	0	0	2	8	15	34	39	13	2
Rectum:										
Male:										
Urban	89	0	1	2	10	17	23	27	9	0
Rural	80	0	1	0	4	13	18	30	12	2
Female:										
Urban	60	0	0	2	3	10	19	19	7	0
Rural	71	0	0	2	4	5	17	31	12	0
Liver:										
Male:										
Urban	8	0	0	0	1	0	5	2	0	0
Rural	5	0	0	0	0	1	1	2	0	1
Female:										
Urban	7	1	0	0	1	0	1	4	0	0
Rural	7	0	0	0	1	1	1	1	2	1
Gall bladder and biliary passages:										
Male:										
Urban	8	0	0	0	0	0	2	5	1	0
Rural	11	0	0	0	1	0	2	4	4	0
Female:										
Urban	26	0	0	0	0	4	8	8	6	0
Rural	21	0	0	1	0	0	8	11	1	0
Pancreas:										
Male:										
Urban	30	0	0	0	2	4	17	5	2	0
Rural	20	0	0	1	0	4	6	5	4	0
Female:										
Urban	22	0	0	0	0	2	12	6	2	0
Rural	13	0	0	0	0	1	5	4	2	1
Other digestive:										
Male:										
Urban	7	0	0	0	0	3	1	2	1	0
Rural	4	0	0	0	0	1	1	2	0	0
Female:										
Urban	9	0	0	0	0	3	3	1	2	0
Rural	13	0	0	0	1	0	2	7	2	1
Respiratory system:										
Male:										
Urban	126	0	0	2	5	33	59	22	5	0
Rural	59	1	0	0	3	10	27	11	7	0
Female:										
Urban	30	1	0	0	2	3	12	8	4	0
Rural	20	0	0	0	0	3	11	6	0	0

Appendix table 5. Number of newly diagnosed resident cases of cancer in Iowa with microscopic confirmation of diagnosis, for urban and rural areas, by primary site, sex, and age—Continued

Primary site, sex, urban and rural areas	All ages	Age (years)								
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over
Respiratory system—Continued										
Larynx:										
Male:										
Urban	16	0	0	0	1	4	10	1	0	0
Rural	9	0	0	0	1	3	2	1	2	0
Female:										
Urban	4	0	0	0	0	0	3	1	0	0
Rural	0	0	0	0	0	0	0	0	0	0
Lung and bronchus:										
Male:										
Urban	109	0	0	2	4	28	49	21	5	0
Rural	46	0	0	0	2	7	25	8	4	0
Female:										
Urban	23	1	0	0	2	3	8	6	3	0
Rural	16	0	0	0	0	3	8	5	0	0
Other respiratory:										
Male:										
Urban	1	0	0	0	0	1	0	0	0	0
Rural	4	1	0	0	0	0	0	2	1	0
Female:										
Urban	3	0	0	0	0	0	1	1	1	0
Rural	4	0	0	0	0	0	3	1	0	0
Breast:										
Male:										
Urban	7	0	0	0	0	2	1	4	0	0
Rural	4	0	0	0	1	1	0	2	0	0
Female:										
Urban	480	0	4	15	57	124	121	97	56	6
Rural	370	0	0	17	47	91	99	84	28	4
Female genital organs:										
Urban	546	2	5	32	93	125	141	89	52	7
Rural	356	1	4	16	44	104	109	61	15	2
Cervix uteri:										
Urban	264	0	2	27	64	63	52	31	22	3
Rural	142	0	0	12	27	46	36	18	3	0
Corpus uteri:										
Urban	76	0	0	1	6	19	20	21	8	1
Rural	75	0	0	1	4	28	23	16	3	0
Uterus, other and unspecified:										
Urban	78	0	2	1	5	20	29	12	9	0
Rural	42	0	1	2	4	7	18	5	4	1
Ovary:										
Urban	93	2	1	1	15	19	29	19	6	1
Rural	70	0	3	1	6	21	23	14	2	0
Other female genital organs:										
Urban	35	0	0	2	3	4	11	6	7	2
Rural	27	1	0	0	3	2	9	8	3	1
Male genital organs:										
Urban	194	0	3	6	9	12	28	56	68	12
Rural	173	0	1	6	6	6	29	62	52	11
Prostate:										
Urban	160	0	0	0	0	8	24	52	64	12
Rural	147	0	0	0	0	1	26	62	47	11
Other male genital organs:										
Urban	34	0	3	6	9	4	4	4	4	0
Rural	26	0	1	6	6	5	3	0	5	0
Urinary organs:										
Male:										
Urban	151	2	1	2	4	24	39	45	28	6
Rural	113	1	0	2	1	14	33	44	16	2
Female:										
Urban	61	2	1	0	2	8	16	16	13	3
Rural	36	1	1	1	1	5	5	17	5	0

Appendix table 5. Number of newly diagnosed resident cases of cancer in Iowa with microscopic confirmation of diagnosis, for urban and rural areas, by primary site, sex, and age—Continued

Primary site, sex, urban and rural areas	All ages	Age (years)								
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over
Urinary organs—Continued										
Kidney:										
Male:										
Urban	25	2	0	1	1	1	9	10	1	0
Rural	18	1	0	2	0	4	5	5	1	0
Female:										
Urban	15	2	1	0	0	2	7	3	0	0
Rural	17	1	1	0	0	4	3	8	0	0
Bladder:										
Male:										
Urban	125	0	1	1	3	23	30	35	27	5
Rural	94	0	0	0	1	10	28	38	15	2
Female:										
Urban	41	0	0	0	2	5	6	13	12	3
Rural	19	0	0	1	1	1	2	9	5	0
Other urinary:										
Male:										
Urban	1	0	0	0	0	0	0	0	0	1
Rural	1	0	0	0	0	0	0	1	0	0
Female:										
Urban	5	0	0	0	0	1	3	0	1	0
Rural	0	0	0	0	0	0	0	0	0	0
Skin:										
Male:										
Urban	351	1	4	9	17	59	96	101	52	12
Rural	281	0	1	6	15	45	66	92	44	12
Female:										
Urban	265	2	3	10	30	35	50	78	46	11
Rural	124	1	0	3	11	18	33	30	21	7
Lip:										
Male:										
Urban	21	0	0	1	0	5	9	5	1	0
Rural	24	0	0	1	2	8	6	4	2	1
Female:										
Urban	4	0	0	0	3	0	0	0	1	0
Rural	6	0	0	0	1	1	1	3	0	0
Face, other:										
Male:										
Urban	220	1	2	5	11	35	59	65	33	9
Rural	164	0	0	1	11	24	39	57	26	6
Female:										
Urban	161	0	1	0	19	22	31	49	28	11
Rural	77	0	0	3	7	9	23	18	13	4
Scalp and neck:										
Male:										
Urban	34	0	2	0	1	5	9	8	9	0
Rural	22	0	1	0	0	3	3	8	6	1
Female:										
Urban	28	1	0	1	2	4	6	12	2	0
Rural	11	0	0	0	0	1	5	4	1	0
Upper limbs:										
Male:										
Urban	30	0	0	0	1	5	9	10	2	3
Rural	33	0	0	0	0	5	11	12	3	2
Female:										
Urban	20	0	0	3	0	2	3	7	5	0
Rural	9	0	0	0	0	1	0	2	3	3
Trunk and lower limbs:										
Male:										
Urban	21	0	0	1	3	3	3	6	5	0
Rural	21	0	0	4	1	4	4	6	2	0
Female:										
Urban	36	1	0	6	4	5	7	5	8	0
Rural	12	1	0	0	3	4	2	1	1	0

Appendix table 5. Number of newly diagnosed resident cases of cancer in Iowa with microscopic confirmation of diagnosis, for urban and rural areas, by primary site, sex, and age—Continued

Primary site, sex, urban and rural areas	All ages	Age (years)								
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over
Skin—Continued										
Skin, other:										
Male:										
Urban	25	0	0	2	1	6	7	7	2	0
Rural	17	0	0	0	1	1	3	5	5	2
Female:										
Urban	16	0	2	0	2	2	3	5	2	0
Rural	9	0	0	0	0	2	2	2	3	0
Eye:										
Male:										
Urban	3	1	0	0	0	1	0	1	0	0
Rural	5	1	0	0	0	1	1	1	0	1
Female:										
Urban	4	0	0	0	0	1	2	1	0	0
Rural	1	0	0	0	0	0	0	1	0	0
Brain and nervous system:										
Male:										
Urban	32	4	1	2	6	4	8	7	0	0
Rural	16	1	1	1	1	7	5	0	0	0
Female:										
Urban	19	2	4	1	1	2	7	2	0	0
Rural	14	2	1	0	0	4	6	1	0	0
Brain:										
Male:										
Urban	31	4	1	2	5	4	8	7	0	0
Rural	13	1	1	1	1	5	4	0	0	0
Female:										
Urban	15	2	4	1	1	1	4	2	0	0
Rural	12	1	1	0	0	3	6	1	0	0
Other nervous system:										
Male:										
Urban	1	0	0	0	1	0	0	0	0	0
Rural	3	0	0	0	0	2	1	0	0	0
Female:										
Urban	4	0	0	0	0	1	3	0	0	0
Rural	2	1	0	0	0	1	0	0	0	0
Endocrine glands: [1]										
Male:										
Urban	14	1	0	1	1	4	5	2	0	0
Rural	8	0	0	1	0	1	4	1	1	0
Female:										
Urban	20	0	1	5	1	6	4	3	0	0
Rural	12	1	3	3	0	0	4	1	0	0
Thyroid:										
Male:										
Urban	13	1	0	1	1	3	5	2	0	0
Rural	5	0	0	1	0	1	2	0	1	0
Female:										
Urban	18	0	1	4	1	5	4	3	0	0
Rural	10	0	2	3	0	0	4	1	0	0

[1] Not elsewhere classified.

Appendix table 5. Number of newly diagnosed resident cases of cancer in Iowa with microscopic confirmation of diagnosis, for urban and rural areas, by primary site, sex, and age—Continued

Primary site, sex, urban and rural areas	All ages	Age (years)								
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over
Endocrine glands [1]—Continued										
Other endocrines:										
Male:										
Urban	1	0	0	0	0	1	0	0	0	0
Rural	3	0	0	0	0	0	2	1	0	0
Female:										
Urban	2	0	0	1	0	1	0	0	0	0
Rural	2	1	1	0	0	0	0	0	0	0
Bone:										
Male:										
Urban	13	2	0	3	1	2	0	3	2	0
Rural	8	1	1	0	2	0	1	1	2	0
Female:										
Urban	6	0	0	1	3	1	0	0	1	0
Rural	5	0	0	0	2	0	1	2	0	0
Soft tissue:										
Male:										
Urban	16	1	0	2	1	5	1	5	1	0
Rural	11	1	0	1	2	2	3	0	1	1
Female:										
Urban	9	1	1	0	1	1	2	1	2	0
Rural	14	1	0	0	4	5	3	0	1	0
Lymphatic tissue:										
Male:										
Urban	57	1	3	9	6	10	17	9	1	1
Rural	36	2	0	3	3	7	12	4	5	0
Female:										
Urban	43	1	2	3	7	12	7	6	5	0
Rural	31	0	2	3	1	6	6	11	2	0
Hematopoietic system:										
Male:										
Urban	64	10	0	3	6	10	16	13	5	1
Rural	64	8	1	1	4	11	16	12	11	0
Female:										
Urban	52	8	3	3	2	6	10	13	6	1
Rural	34	7	2	0	3	5	8	6	3	0
Ill-defined sites:										
Male:										
Urban	46	0	0	1	1	7	18	16	2	1
Rural	33	3	0	0	0	11	9	6	3	1
Female:										
Urban	58	0	0	0	6	10	23	10	8	1
Rural	39	0	0	1	1	11	12	7	7	0

[1] Not elsewhere specified.

Appendix table 6. Number of resident cases of cancer in Iowa prevalent in 1950, by primary site, sex, and age

Primary site and sex	All ages	Age (years)								
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over
All sites	*13, 339*	*132*	*123*	*362*	*904*	*1, 971*	*3, 160*	*3, 557*	*2, 524*	*606*
Male	6, 443	74	54	147	273	749	1, 501	1, 878	1, 424	343
Female	6, 896	58	69	215	631	1, 222	1, 659	1, 679	1, 100	263
Buccal cavity and pharynx	*751*	*2*	*11*	*26*	*42*	*108*	*173*	*197*	*154*	*38*
Male	619	1	9	20	37	78	145	160	132	37
Female	132	1	2	6	5	30	28	37	22	1
Lip	360	0	1	10	22	57	85	86	77	22
Male	336	0	1	10	22	50	80	81	70	22
Female	24	0	0	0	0	7	5	5	7	0
Tongue	62	0	0	0	2	10	12	22	13	3
Male	43	0	0	0	2	7	9	14	8	3
Female	19	0	0	0	0	3	3	8	5	0
Salivary glands	94	0	2	12	8	15	16	21	18	2
Male	51	0	1	6	4	4	8	12	14	2
Female	43	0	1	6	4	11	8	9	4	0
Mouth, other	146	2	4	2	5	13	34	46	31	9
Male	118	1	4	2	4	10	26	35	28	8
Female	28	1	0	0	1	3	8	11	3	1
Pharynx	89	0	4	2	5	13	26	22	15	2
Male	71	0	3	2	5	7	22	18	12	2
Female	18	0	1	0	0	6	4	4	3	0
Digestive system	*3, 092*	*4*	*12*	*35*	*112*	*305*	*694*	*962*	*800*	*168*
Male	1, 631	2	4	15	59	157	386	523	405	80
Female	1, 461	2	8	20	53	148	308	439	395	88
Esophagus	76	0	0	0	1	5	21	29	17	3
Male	57	0	0	0	1	4	20	20	10	2
Female	19	0	0	0	0	1	1	9	7	1
Stomach	830	0	1	1	14	66	152	251	290	55
Male	526	0	0	0	8	39	111	172	166	30
Female	304	0	1	1	6	27	41	79	124	25
Small intestine	44	2	1	0	2	6	9	13	7	4
Male	23	2	0	0	2	3	7	5	3	1
Female	21	0	1	0	0	3	2	8	4	3
Large intestine	1, 029	1	6	20	52	107	234	312	239	58
Male	458	0	1	9	25	39	108	143	108	25
Female	571	1	5	11	27	68	126	169	131	33
Rectum	549	0	3	8	31	72	134	170	111	20
Male	312	0	2	4	17	45	75	97	58	14
Female	237	0	1	4	14	27	59	73	53	6

Appendix table 6. Number of resident cases of cancer in Iowa prevalent in 1950, by primary site, sex, and age—Continued

Primary site and sex	All ages	Age (years)								
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over
Digestive system—Continued										
Liver	160	1	0	1	3	9	28	55	46	17
Male	66	0	0	0	0	6	15	24	16	5
Female	94	1	0	1	3	3	13	31	30	12
Gall bladder and biliary passages	109	0	0	3	3	7	27	43	25	1
Male	29	0	0	0	2	0	5	13	9	0
Female	80	0	0	3	1	7	22	30	16	1
Pancreas	228	0	0	1	4	24	74	64	53	8
Male	130	0	0	1	3	17	40	37	29	3
Female	98	0	0	0	1	7	34	27	24	5
Other digestive	67	0	1	1	2	9	15	25	12	2
Male	30	0	1	1	1	4	5	12	6	0
Female	37	0	0	0	1	5	10	13	6	2
Respiratory system	*567*	*4*	*0*	*5*	*20*	*99*	*203*	*159*	*66*	*11*
Male	427	1	0	5	16	82	164	106	47	6
Female	140	3	0	0	4	17	39	53	19	5
Larynx	81	0	0	2	4	15	28	23	9	0
Male	73	0	0	2	4	15	26	19	7	0
Female	8	0	0	0	0	0	2	4	2	0
Lung and bronchus	457	3	0	3	16	79	169	126	51	10
Male	337	0	0	3	12	63	136	81	36	6
Female	120	3	0	0	4	16	33	45	15	4
Other respiratory	29	1	0	0	0	5	6	10	6	1
Male	17	1	0	0	0	4	2	6	4	0
Female	12	0	0	0	0	1	4	4	2	1
Breast	*1,704*	*0*	*6*	*46*	*187*	*387*	*413*	*399*	*218*	*48*
Male	21	0	0	0	2	3	7	8	0	1
Female	1,683	0	6	46	185	384	406	391	218	47
Female genital organs	*1,733*	*4*	*13*	*75*	*262*	*415*	*472*	*308*	*154*	*30*
Cervix uteri	829	0	6	61	184	210	191	108	58	11
Corpus uteri	264	0	0	3	16	71	80	65	28	1
Uterus, other and unspecified	238	0	3	3	17	48	81	42	34	10
Ovary	300	3	4	7	39	74	88	62	20	3
Other female genital organs	102	1	0	1	6	12	32	31	14	5
Male genital organs	*1,077*	*0*	*4*	*20*	*23*	*36*	*153*	*350*	*397*	*94*
Prostate	978	0	0	0	1	21	135	341	387	93
Other male genital organs	99	0	4	20	22	15	18	9	10	1
Urinary organs	*725*	*15*	*3*	*10*	*18*	*89*	*177*	*238*	*139*	*36*
Male	504	6	1	7	10	63	135	167	91	24
Female	221	9	2	3	8	26	42	71	48	12

Appendix table 6. Number of resident cases of cancer in Iowa prevalent in 1950, by primary site, sex, and age—Continued

Primary site and sex	All ages	Age (years)								
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over
Urinary organs—Continued										
Kidney	171	14	2	5	5	24	42	61	16	2
Male	99	6	0	3	3	15	27	38	6	1
Female	72	8	2	2	2	9	15	23	10	1
Bladder	545	1	1	5	13	62	131	176	123	33
Male	403	0	1	4	7	48	108	128	85	22
Female	142	1	0	1	6	14	23	48	38	11
Other urinary	9	0	0	0	0	3	4	1	0	1
Male	2	0	0	0	0	0	0	1	0	1
Female	7	0	0	0	0	3	4	0	0	0
Skin	*1, 976*	*4*	*16*	*41*	*105*	*258*	*437*	*585*	*405*	*125*
Male	1, 257	1	11	23	50	180	289	376	254	73
Female	719	3	5	18	55	78	148	209	151	52
Lip	103	0	0	2	10	21	27	24	14	5
Male	81	0	0	2	4	19	21	18	12	5
Female	22	0	0	0	6	2	6	6	2	0
Face, other	1, 299	1	7	18	69	152	286	388	281	97
Male	821	1	6	12	35	104	188	243	174	58
Female	478	0	1	6	34	48	98	145	107	39
Scalp and neck	149	1	3	3	6	18	34	50	30	4
Male	92	0	3	1	2	13	18	30	24	1
Female	57	1	0	2	4	5	16	20	6	3
Upper limbs	135	0	1	4	3	21	33	43	24	6
Male	94	0	0	0	2	16	29	33	12	2
Female	41	0	1	4	1	5	4	10	12	4
Trunk and lower limbs	138	2	2	14	12	27	25	31	20	5
Male	67	0	2	8	5	14	11	17	8	2
Female	71	2	0	6	7	13	14	14	12	3
Skin, other	152	0	3	0	5	19	32	49	36	8
Male	102	0	0	0	2	14	22	35	24	5
Female	50	0	3	0	3	5	10	14	12	3
Eye	*30*	*4*	*0*	*1*	*0*	*6*	*5*	*9*	*2*	*3*
Male	18	3	0	0	0	4	1	5	2	3
Female	12	1	0	1	0	2	4	4	0	0

Appendix table 6. Number of resident cases of cancer in Iowa prevalent in 1950, by primary site, sex, and age—Continued

Primary site and sex	All ages	Age (years)								
		Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75–84	85 and over
Brain and nervous system	*167*	*18*	*14*	*12*	*22*	*37*	*44*	*20*	*0*	*0*
Male	101	11	7	7	15	24	25	12	0	0
Female	66	7	7	5	7	13	19	8	0	0
Brain	142	16	14	10	19	29	36	18	0	0
Male	90	10	7	6	13	21	21	12	0	0
Female	52	6	7	4	6	8	15	6	0	0
Other nervous system	25	2	0	2	3	8	8	2	0	0
Male	11	1	0	1	2	3	4	0	0	0
Female	14	1	0	1	1	5	4	2	0	0
Endocrine glands[1]	*90*	*2*	*4*	*13*	*4*	*15*	*30*	*16*	*4*	*2*
Male	36	1	0	3	2	8	14	6	2	0
Female	54	1	4	10	2	7	16	10	2	2
Thyroid	76	1	3	11	4	10	26	15	4	2
Male	27	1	0	2	2	4	11	5	2	0
Female	49	0	3	9	2	6	15	10	2	2
Other endocrines	14	1	1	2	0	5	4	1	0	0
Male	9	0	0	1	0	4	3	1	0	0
Female	5	1	1	1	0	1	1	0	0	0
Bone	*93*	*7*	*7*	*10*	*12*	*10*	*13*	*19*	*14*	*1*
Male	56	4	6	5	5	6	5	12	13	0
Female	37	3	1	5	7	4	8	7	1	1
Soft tissue	*75*	*6*	*1*	*6*	*12*	*13*	*20*	*10*	*5*	*2*
Male	37	3	0	3	4	7	10	6	2	2
Female	38	3	1	3	8	6	10	4	3	0
Lymphatic tissue	*348*	*6*	*18*	*42*	*39*	*69*	*79*	*65*	*26*	*4*
Male	199	5	8	27	26	37	47	30	16	3
Female	149	1	10	15	13	32	32	35	10	1
Hematopoietic system	*460*	*52*	*12*	*14*	*32*	*64*	*117*	*109*	*53*	*7*
Male	271	33	3	8	21	42	67	62	31	4
Female	189	19	9	6	11	22	50	47	22	3
Ill-defined sites	*451*	*4*	*2*	*6*	*14*	*60*	*130*	*111*	*87*	*37*
Male	189	3	1	4	3	22	53	55	32	16
Female	262	1	1	2	11	38	77	56	55	21

[1] Not elsewhere classified.

Appendix table 7. Number[1] of newly diagnosed cases of cancer in Iowa with microscopically confirmed diagnoses, 1950, by histological type and sex

List No.[2]	Histological type	Total	Male	Female
	All types	*6,562*	*3,025*	*3,537*
00–09	*Tumors of glandular epithelium*	*2,660*	*915*	*1,745*
00	Ductal carcinoma	96	3	93
01	Mucinous carcinoma	68	23	45
02	Polypoid carcinoma[3]	174	64	110
03	Cystadenocarcinoma[3]	22	1	21
04–05	Functionally active tumors	6		6
06–07	Adenocarcinoma[3]	6		6
09	Adenocarcinoma, unspecified	2,288	824	1,464
11–14	*Tumors of nonglandular epithelium*	*1,975*	*1,138*	*837*
11	Transitional cell carcinoma	218	174	44
12	Basal cell carcinoma	497	295	202
13	Baso-squamous cell carcinoma	27	17	10
14	Squamous cell carcinoma	1,233	652	581
17	*Melanoma*	*79*	*35*	*44*
18–19	*Tumors of epithelium*[3]	*927*	*449*	*478*
18	Specific tumors of epithelium[3]	4	3	1
19	Unspecified tumors of epithelium[3]	923	446	477
20–29	*Leukemia*	*197*	*119*	*78*
20	Lymphocytic leukemia	97	64	33
21	Monocytic leukemia	15	11	4
22	Granulocytic leukemia	44	22	22
26	Compound leukemia	1		1
27	Leukemia and lymphoma	4	3	1
28	Leukemia[3]			
29	Leukemia, unspecified	36	19	17
30–39	*Lymphoma*	*226*	*126*	*100*
30	Lymphosarcoma	97	58	39
31	Reticulum cell sarcoma	19	10	9
32	Hodgkin's disease	52	29	23
33	Plasma cell myeloma	27	16	11
34	Giant follicular lymphoma	5	3	2
39	Lymphoma, unspecified	26	10	16
40–49	*Tumors of neural tissue and associated structures*	*92*	*50*	*42*
40	Ganglioma			
41	Sympathicoblastoma	4	3	1
42	Medulloblastoma and neuroepithelioma	5	4	1
43	Pheochromocytoma			
44	Argentaffinoma	12	5	7
45	Schwannoma	3	1	2
46	Meningioma	4	1	3
47	Glioma	59	34	25
48	Ependymoma	5	2	3

Appendix table 7. Number[1] of newly diagnosed cases of cancer in Iowa with microscopically confirmed diagnoses, 1950, by histological type and sex—Continued

List No.[2]	Histological type	Total	Male	Female
50–59	*Tumors of vascular tissue*	*9*	*7*	*2*
50	Angiosarcoma	7	5	2
52	Multiple hemorrhagic sarcoma			
53	Hemangiopericytoma			
54	Lymphangiosarcoma	2	2	
66–69	*Tumors of muscle*	*18*	*1*	*17*
66	Leiomyosarcoma	15		15
67	Rhabdosarcoma	1		1
68	Myosarcoma [3]			
69	Myosarcoma, unspecified	2	1	1
70–77	*Tumors of connective tissue*	*77*	*40*	*37*
70	Fibrosarcoma	39	19	20
71	Myxosarcoma [3]	7	2	5
72	Liposarcoma	4	3	1
73	Chondrosarcoma	10	7	3
74	Giant cell sarcoma	5	2	3
75	Ewing's sarcoma	2	1	1
76	Osteosarcoma	5	3	2
77	Synovial sarcoma	5	3	2
79	*Tumors of nonepithelial tissues* [3]	*34*	*16*	*18*
80–89	*Tumors of embryonal and mixed tissues*	*94*	*58*	*36*
80	Chorioma	2		2
81	Seminoma and disgerminoma	19	16	3
82	Teratoma, except of testis	17	9	8
83	Nephroblastoma, hepatoblastoma, teratoma testis	31	21	10
84	Thymoma			
85	Mixed salivary gland tumor	22	11	11
86	Odontogenic tumor	2	1	1
87	Mesenchymoma, other specific	1		1
88	Embryonal and mixed tumors, other specific			
89	Embryonal and mixed tumors, unspecified			
97–99	*Tumors not elsewhere classified*	*174*	*71*	*103*
98	Tumors of specific tissues [3]	2	1	1
99	General and unspecified terms	172	70	102

[1] Includes nonresidents.
[2] Manual of Tumor Nomenclature and Coding, American Cancer Society, 1951.
[3] Not elsewhere classified.

NOTE: Of the 8,198 reported resident cases (excluding cases obtained from death certificates) 6,191 (76 percent) were microscopically confirmed. Of the 489 nonresident cases (excluding cases obtained from death certificates) 371 were microscopically confirmed. The term "malignant" is omitted since this report deals only with malignant neoplasms.

Appendix table 8. Percentage distribution of newly diagnosed resident cases of cancer in Iowa, by histological type, for detailed primary sites (microscopically confirmed cases only)

Primary site	All types	Percentage distribution, by histological type					
		Adenocarcinoma (00–09)	Transitional cell carcinoma (11)	Basal and basosquamous cell carcinoma (12, 13)	Squamous cell carcinoma (14)	Epithelial carcinoma [1] (18, 19)	Other types
All sites:							
Number	6,562	2,666	218	524	1,233	927	1,000
Percent	100.0	40.5	3.3	8.0	18.8	14.1	15.3
Buccal cavity and pharynx	*373*	*11.0*	*0*	*4.3*	*65.3*	*9.4*	*10.0*
Lip	175	1.1	0	7.4	74.9	11.4	5.2
Tongue	27	7.4	0	0	88.9	3.7	0
Salivary glands	58	43.2	0	0	8.6	8.6	39.6
Mouth, other	77	11.7	0	3.9	68.8	10.4	5.2
Pharynx	36	8.3	0	0	86.1	2.8	2.8
Digestive system	*1,352*	*76.0*	*0*	*.1*	*3.2*	*15.0*	*5.7*
Esophagus	41	29.3	0	2.4	15.2	17.1	0
Stomach	264	71.5	0	0	1.9	19.7	6.9
Small intestine	23	52.3	0	0	0	17.4	30.3
Large intestine	484	83.6	0	0	.4	10.9	5.1
Rectum	317	84.9	0	0	3.2	8.8	3.1
Liver	27	51.9	0	0	0	37.0	11.1
Gall bladder and biliary passages	68	69.1	0	0	4.4	20.6	5.9
Pancreas	91	67.0	0	0	1.1	28.6	3.3
Other digestive	37	51.4	0	0	2.7	24.3	21.6
Respiratory system	*249*	*17.3*	*0*	*.8*	*31.3*	*45.0*	*5.6*
Larynx	31	6.5	0	3.2	80.6	6.5	3.2
Lung and bronchus	204	19.1	0	0	24.0	51.5	5.4
Other respiratory	14	14.3	0	7.1	28.6	35.8	14.2
Breast	*914*	*76.2*	*0*	*.1*	*.7*	*19.7*	*3.3*
Female genital organs	*970*	*43.9*	*.1*	*0*	*38.6*	*10.3*	*7.1*
Cervix uteri	442	10.4	.2	0	74.3	11.1	4.0
Corpus uteri	159	91.8	0	0	3.8	1.3	3.1
Uterus, other and unspecified	127	66.1	0	0	2.4	11.0	20.5
Ovary	178	74.8	0	0	1.7	15.7	7.8
Other female genital organs	64	25.0	0	0	53.1	10.9	11.0
Male genital organs	*407*	*57.5*	*.2*	*0*	*4.9*	*22.9*	*14.5*
Prostate	344	67.7	.3	0	.3	26.2	5.5
Other male genital organs	63	1.6	0	0	30.2	4.8	63.4
Urinary organs	*392*	*17.6*	*54.8*	*.3*	*11.2*	*12.0*	*4.1*
Kidney	83	67.6	8.4	1.2	4.8	6.0	12.0
Bladder	302	4.3	67.5	0	12.3	13.9	2.0
Other urinary	7	0	57.1	0	42.9	0	0
Endocrine glands [1]	*57*	*71.8*	*0*	*0*	*1.8*	*15.8*	*10.6*
Thyroid	48	79.1	0	0	2.1	16.7	2.1
Other endocrines	9	33.4	0	0	0	11.1	55.5
Other and ill-defined sites (except below)	*202*	*37.6*	*.5*	*1.5*	*5.4*	*28.7*	*26.3*

Appendix table 8. Percentage distribution of newly diagnosed resident cases of cancer in Iowa by histological type for detailed primary sites (microscopically confirmed cases only)—Continued

Primary site	All types	Percentage distribution, by histological type				
		Basal and basosquamous cell carcinoma (12, 13)	Squamous cell carcinoma (14)	Melanoma (17)	Epithelial carcinoma [1] (18, 19)	Other types
Skin	*1,067*	*46.8*	*38.4*	*5.2*	*7.1*	*2.5*
Lip	55	29.1	65.5	0	3.6	1.8
Face, head, and neck	753	55.8	33.5	2.8	6.6	1.3
Other and unspecified	259	24.7	47.1	13.1	9.3	5.8
		Epithelial carcinoma [1] (18, 19)	Glioma (47)	Other nervous tissue (40–46, 48, 49)	Vascular tissue (50–59)	Non-epithelial tissues [1] (78, 79)	Other tumors [1] (98, 99)
Brain and nervous system	*88*	*5.7*	*65.9*	*19.3*	*2.3*	*1.1*	*5.7*
Brain	77	6.5	74.0	11.7	1.3	0	6.5
Other nervous system	11	0	9.1	72.7	9.1	9.1	0
		Epithelial carcinoma [1] (18, 19)	Fibro-sarcoma (70)	Other sarcoma (71–77)	Non-epithelial tissues (78, 79)	Embryonal and mixed tumors (80–84, (86–89)	Other tumors [1] (98, 99)
Bone	*33*	*9.1*	*3.0*	*66.7*	*12.1*	*3.0*	*6.1*
		Vascular tissue (50–59)	Muscle tissue (66–69)	Fibro-sarcoma (70)	Other sarcoma (71–77)	Other types	
Soft tissue	*52*	*5.8*	*5.8*	*52.0*	*21.2*	*15.2*	
		Epithelial carcinoma [1] (18, 19)	Lympho-sarcoma (30)	Reticulum cell sarcoma (31)	Hodgkin's disease (32)	Other lymphomas (33–39)	Other types
Lymphatic tissue	*180*	*2.2*	*45.0*	*6.7*	*28.3*	*16.1*	*1.7*
		Lympho-cytic leukemia (20)	Mono-cytic leukemia (21)	Granulo-cytic leukemia (22)	Other and un-specified leukemias (26, 27, 29)	Lympho-sarcoma (30)	Plasma cell myeloma (33)
Hematopoietic system	*226*	*43.0*	*6.6*	*19.5*	*18.1*	*0.9*	*11.9*

[1] Not elsewhere classified.

NOTE: Figures in parentheses are list numbers, Manual of Tumor Nomenclature and Coding (*51*).

Current Titles

Public Health Monographs

No. 25. Sickness experience in selected areas of the United States. Selwyn D. Collins, Katharine S. Trantham, and Josephine L. Lehmann. (Public Health Service Publication No. 390) 1955. 96 pages. Illustrated. 50 cents. [Published concurrently with *Public Health Reports* 70: (1); see pages 81–82 for summary.]

No. 26. A history of plague in the United States. Vernon B. Link. (Public Health Service Publication No. 392) 1955. 120 pages. Illustrated. 60 cents. [Published concurrently with *Public Health Reports* 70: (3); see pages 335–336 for summary article.]

No. 27. Roof rat populations in southwest Georgia. Dean H. Ecke. (Public Health Service Publication No. 373) 1955. 18 pages. Illustrated. 20 cents. [Published concurrently with *Public Health Reports* 70: (4); see pages 413–414 for summary.]

No. 28. Tularemia in sheep and in sheep industry workers. William L. Jellison and Glen M. Kohls. (Public Health Service Publication No. 421) 1955. 17 pages. Illustrated. 20 cents. [Published concurrently with *Public Health Reports* 70: (7); see pages 720–721 for summary.]

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